McMaster University

SENATE MINUTES

Wednesday, November 11, 2015 at 3:30 p.m.
In the Council Room (111), Gilmour Hall

PRESENT: Dr. Patrick Deane (Chair), Ms Leah Allan, Dr. Vishwanath Baba, Mr. Jacob Bailey, Dr. Robert Baker, Dr. Lee Beach, Dr. Patrick Bennett, Dr. Narat Charupat, Mr. Ken Clarke, Mr. Roger Couldrey, Mr. Ian Cowan, Dr. Ken Cruikshank, Dr. Susan Denburg, Dr. James Dunn, Mr. Daniel Elbilt, Dr. Carlos Filipe, Mr. Peter Gardhouse, Dr. Don Goellnicht, Dr. Elzbieta Grodek, Dr. Sheila Harms, Dr. Alison Holloway, Dr. Shafiquil Huque, Dr. Jerry Hurley, Dr. John Kelton, Ms Varda Khan, Dr. Ivona Kúčerová, Dr. Graeme Luke, Dr. Colleen McKey, Dr. Paul McNicholas, Mr. Sid Nath, Dr. Dorothy Pawluch, Dr. Ishwar Puri, Dr. Christine Quail, Dr. Petra Rethmann, Dr. Carl Richards, Dr. Aaron Schat, Dr. Susan Searls Giroux, Dr. Allison Sekuler, Dr. Ravi Selvaganapathy, Dr. Chris Sinding, Ms Moira Taylor, Dr. Lehana Thabane, Mr. Peter Tice, Mr. Philip Tominac, Ms Veronica van der Vliet, Dr. Brenda Vrkljan, Dr. Leonard Waverman, Dr. Doug Welch, Ms Mary Williams, Dr. J.P. Xu, Ms Helen Ayre (Secretary of the Senate), Susan Welstead (Assistant University Secretary)

OBSERVERS: Ms Carolyn Brendon, Ms Esme Davies, Dr. Michelle Dion, Ms Andrea Farquhar, Ms Kira Feldman, Dr. Jacy Lee, Ms Vivian Lewis, Mr. Ehima Osazuwa, Ms Melissa Pool, Dr. Fiona Smaill, Mr. Sean Van Koughnett, Dr. Jean Wilson

REGRETS RECEIVED: Dr. Mark Boda, Dr. Roy Cain, Dr. Tim Davidson, Dr. Susan Fast, Dr. Bonnie Freeman, Mr. Mitchell Hajnal, Dr. Janice Hladki, Ms Rebecca Jamieson, Dr. Suzanne Labarge, Dr. Patricia McNiven, Dr. Stan Porter, Dr. Matt Valeriote

A. OPEN SESSION

OPENING REMARKS

Dr. Deane introduced the three new student Senators who had been elected or acclaimed during the recent election cycle. He also thanked Dr. Roy Cain, who was about to complete his term as Acting Dean of Social Sciences.

He then noted that Senators had received the most recent report of the Forward With Integrity initiative, titled “Forward With Integrity: The Next Phase” together with the list of McMaster goals and priorities for 2014-15 from the University Fact Book.

He reported that McMaster had submitted its letter of intent to the second round of the Canada First Research Excellence Fund competition with a project titled “Integrated Molecular Population Science.” The project submission process was being led by Dr. Gerry Wright and Dr. Salim Yusuf.
I APPROVAL OF AGENDA – OPEN SESSION

Dr. Deane confirmed that no requests had been received to move any items from the Consent to the Regular agenda of the Open Session.

It was duly moved and seconded,

"that the Senate approve the Open Session agenda for the meeting of November 11, 2015 and that items II to IV be approved by consent."

The motion was carried.

CONSENT

II MINUTES

Motion:

that the minutes of the Open Session portion of the meeting held on October 14, 2015 be approved as circulated

Approved by Consent

III BUSINESS ARISING

a. Report From Undergraduate Council (Appendix A)
   i. Correction of a Previous Council Report

Senate received by consent, for information, corrections to the start dates for two new programs that had been approved at the February 11, 2015 meeting.

b. Report From the Committee on By-laws (Appendix B)
   i. Proposed Revisions to the Faculty of Social Sciences By-laws
      1. Section V, item iii: Graduate Curriculum and Policy Committee

Motion:

that the Senate give final approval to revisions to the Faculty of Social Sciences By-Laws as set out in Attachment I of Appendix B, effective November 11, 2015

Approved by Consent
ii. Proposed Revisions to the Faculty of Engineering By-laws

1. Section I, item i: Membership of the Faculty
2. Section IV, item v: Graduate Curriculum and Policy Committee
3. Section IV, item vii: Student and Professional Affairs Committee
4. Section V: Elections

Motion:

that the Senate give final approval to revisions to the Faculty of Engineering By-Laws as set out in Attachment II of Appendix B, effective November 11, 2015

Approved by Consent

IV COMMUNICATIONS

a. Results of the Fall 2015 Student Elections to Senate (Appendix C)

Senate received this report by consent, for information.

REGULAR

V BUSINESS ARISING

There was no business arising from the Open Session minutes for the regular agenda.

VI ENQUIRIES

There were no enquiries.

VII COMMUNICATIONS

a. Memorandum re Confidentiality (Appendix D)

Senate received, for information, a communication from the Secretary of the Senate which had been circulated to remind continuing Senate members and inform new members of the rules of confidentiality for open and closed sessions of Senate and Senate Committee meetings.

b. Notification re Access Copyright (Appendix E)

Senate received, for information, a communication from the Provost’s Office indicating that McMaster was terminating its licence agreement with the copyright collective Access Copyright.
The Associate University Librarian (Library Services), Ms Pottier, explained that the decision had been made by the Provost, in consultation with the University’s Copyright Advisory Group, legal counsel, the University Library and other McMaster stakeholders.

The University would continue its commitment to copyright compliance, which is an ongoing legal duty and an integral component of academic integrity. Newly developed internal resources would become available to assist staff and faculty with clearing necessary copyright permissions, to ensure all are aware of their rights and responsibilities under the University’s Fair Dealing Policy and the Copyright Modernization Act.

The University had been using the Fair Dealing Policy in parallel with its Access Copyright licence for some time and it was felt that stakeholders had a good understanding of the processes necessary to uphold legal obligations.

c. Oral Report From the COU Colleague on the October 15, 2015 Meeting of the Council of Ontario Universities

The Council of Ontario Universities colleague, Dr. Sekuler, reported that much of the colleagues’ discussion at the October 15 meeting was speculation on what would happen if one or the other federal party was elected.

Other discussion focused on the importance of experiential learning, particularly on the need to establish a broader definition of this type of learning, to manage and sustain the growth of these programs, and to effectively communicate opportunities for experiential learning.

Colleagues also discussed the review of the funding formula for Ontario universities that is underway. COU established a task force that produced recommendations unanimously accepted by the Executive Heads, and conveyed to former Deputy Minister Sue Herbert, who is the Executive Lead, University Funding Formula Consultation at Ontario’s Ministry of Training Colleges and Universities. The consultation phase had just finished. Ms Herbert will be submitting a report to Cabinet.

VIII REPORTS FROM COUNCILS

a. Graduate Council (Appendix F)

i. Proposal to Close the Master of Engineering in Chemical Engineering Program

Dr. Welch explained that, because there had been no student enrolment for several years and the Department wished to focus attention on the M.A.Sc. and Ph.D. degrees it offers, the Department of Chemical Engineering has requested approval to close its M.Eng. program. The fact that the M.Eng. is still listed despite no intake creates confusion both administratively and for students who apply to the M.Eng. assuming it is a thesis-based master’s. Moreover, should a student wish to take the M.Eng program, the need for faculty to
supervise the project component of the degree is highly time-consuming and has minimal potential benefits relative to the M.A.Sc. program. Graduate Council supported the proposal.

It was duly moved and seconded,

"that the Senate approve the closure of the M.Eng. program in Chemical Engineering as of the 2016-17 academic year, as detailed in Appendix F."

The motion was carried.

ii. Proposal to Add a Critical Leadership in Social Services and Communities Stream to the Master of Social Work Program

Dr. Welch explained that Graduate Council had approved a proposal from the School of Social Work to add a new stream in Critical Leadership in Social Services and Communities to the Master of Social Work program. The stream would be course- and practicum-based and was designed for people who have experience working in social or community services and who aspire to leadership roles. The new stream shares key learning objectives with the new Graduate Diploma in Critical Leadership in Social Services and Communities (approved at Senate in June 2015) as well as the existing MSW in Critical Analysis of Social Work.

It was duly moved and seconded,

"that the Senate approve the addition of Critical Leadership in Social Services and Communities as a stream / field in the Master of Social Work Program in the School of Social Work, for inclusion in the 2016-17 Graduate Calendar."

The motion was carried.

b. Undergraduate Council (Appendix G)

i. Proposal to Establish an Honours Bachelor of Science in Neuroscience Program

Dr. Searls Giroux explained that, at its meetings on December 9, 2014 and September 15, 2015, the Undergraduate Council approved, for recommendation to Senate, a proposal to establish an Honours Bachelor of Science in Neuroscience program. The program was geared toward undergraduate students who were interested in pursuing careers in neuroscience research or other fields built upon a strong interdisciplinary science foundation. The new Neuroscience program would be administered jointly by the Department of Biology and the Department of Psychology, Neuroscience and Behaviour. The proposed program would enhance the University’s currently identified institutional program strengths in Science and Discovery, Health and Society, and Medical Education and Research, as set forth in McMaster’s Strategic Mandate Agreement.

It was duly moved and seconded,
“that the Senate approve the establishment of the Bachelor of Science in Neuroscience program, for inclusion in the 2016-17 Undergraduate Calendar, as outlined in Attachment I of Appendix G.”

A member commented that he was sorry to see that the appendices mentioned in the report were not included in the Senate package. He wondered which physics course students would need to take in first year in order to get into the program. His concern was that students who took a more in-depth course that would prepare them better for such a program might receive lower grades than those who took a more general course and would thus be penalized at the admission stage, since admission to the program in second year would be based on first-year marks. He was hoping that admission to the program would consider courses taken, not just the course averages.

Ms Ayre confirmed that the appendices in question were on the web with the Undergraduate Council material.

Dr. Bennett, one of the developers of the program proposal, said the physics requirements had been discussed with the Department of Physics and Astronomy and they had not raised any concerns about the appropriateness of the courses in terms of admission to the program.

The motion was then voted on and carried.

ii. Replacement of Supplementary Application Tool for Admission to the Nursing Program

Dr. Searls Giroux explained that the Undergraduate Council Executive Committee, acting on behalf of Undergraduate Council, approved by e-mail in July a proposal from the School of Nursing to replace their existing supplementary application tool with CASPer, beginning with the admission cycle for students entering the program in September 2016. CASPer is a screening tool used to assess the applicant’s personal characteristics and has been used by the School of Medicine since 2011. Undergraduate Council received the report for information at its meeting of September 15, 2015.

A member asked what the motivation was to switch to the new tool. Dr. Searls Giroux said her understanding was that CASPer was simply a better program than they had been using.

Senate received this report for its information.

IX REPORT FROM UNIVERSITY PLANNING COMMITTEE (Appendix H)

a. Proposal to Terminate the Department of Medical Physics and Applied Radiation Sciences

Dr. Deane noted that Senate had received a request from a non-member, Dr. Fiona McNeill, to speak to this issue, which would require a two-thirds majority vote in favour from the assembled members.
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It was duly moved and seconded,

“that, notwithstanding the notice requirements of By-law 64, the Senate permit Dr. Fiona McNeill to address Senate on behalf of the Department of Medical Physics and Applied Radiation Sciences, and to answer any follow-up questions Senators may have.”

The motion was carried, with a two-thirds majority.

Dr. Deane said he would next ask Dr. Denburg to present the motion to terminate the Department, and then have Dean Baker speak to it. Following that, Dr. McNeill would be invited to speak.

Dr. Denburg explained that, at its meeting on October 21, 2015, the University Planning Committee approved a proposal to terminate the Department of Medical Physics and Applied Radiation Sciences, which had been addressed in the Faculty of Science Academic Plan for 2014-19. The undergraduate Medical Radiation Sciences program (offered jointly with Mohawk College) and the graduate Medical Physics program would continue unchanged. However, the undergraduate Medical Physics program was currently unsustainable and there would be an evaluation of how best to offer this field of study in the future. The Department’s faculty members would be moved to other Science departments or to the new School of Interdisciplinary Science, but their research, teaching and supervision duties would remain largely unchanged. The Dean had informed UPC that the issue had been discussed at length at a recent meeting of the General Faculty, where a confidential vote was taken on the closure. The majority of faculty voted to support the termination of the Department.

It was duly moved and seconded,

“that the Senate approve, for recommendation to the Board of Governors, the termination of the Department of Medical Physics and Applied Radiation Sciences, effective December 31, 2015, as outlined in Attachment I of Appendix H.”

Dr. Baker said the proposal to close the Department of Medical Physics and Applied Radiation Sciences stemmed from the academic planning process the Faculty of Science started two years ago. A great deal of work and consultation had gone into the plan. The initial draft had been posted on the web, and feedback was solicited through a dedicated e-mail account; the plan had been discussed at several meetings of the Faculty Executive and at General Faculty meetings. The final draft of the proposal had been released last fall and the Faculty had been working to implement the various components ever since.
The plan touched on many aspects of the Faculty, but throughout was the recognition that the Faculty had entered a period of severe financial restraints. In the first year of the new budget model, the Faculty was faced with a $5 million annual deficit and the spectre of an enormous debt a few years out. Overall, the Faculty was facing a 10 per cent cut in its funding.

Consequently, Dr. Baker explained, much of the plan was an attempt to reallocate the Faculty’s extremely limited funding in such a way as to maximize the quality of teaching and research programs across the Faculty.

As it currently stood, virtually all the Faculty’s undergraduate programs were facing difficult cuts in faculty and staff, and, in some cases, the very existence of some programs was threatened. The Faculty had been in a hiring freeze for about a year and a half, and when it does start hiring again, it was expected the Faculty will have resources sufficient to hire one faculty member for every five that retired or left McMaster. This would result in a loss of 20 to 25 colleagues overall.

Therefore, Dr. Baker said, it was absolutely critical that the Faculty allocated its very limited resources to where they were most needed, and it was obvious that the Faculty could not cover everything it had covered in the past.

In that context, it had become clear to the Faculty’s planning committee that the Department of Medical Physics and Applied Radiation Sciences was not sustainable. The Department required a disproportionate amount of the Faculty’s resources for the programs it offered. The Medical Physics program was particularly problematic in that it attracted a very small number of students yet caused the majority of the costs.

Another issue was that, while the Faculty could not guarantee when colleagues would retire, it was likely that several colleagues in the Department would retire in the next five years, and there was zero expectation that they would be replaced. Again, Dr. Baker said, the Faculty needed to put its new hires where the students were. In addition to retirements, other individuals in the Department had requested transfers to other units in the Faculty, so it was very feasible that, in a few years, the Faculty would have a small number of younger McMaster-based colleagues stranded in a Department that had no future.

The Faculty therefore proposed to close the Department, and it may close the Medical Physics undergraduate program in order to allocate more resources to where the students were. The proposal to close did not stem from any concerns over the quality of the existing program or any concerns about the faculty. In fact, many colleagues in the unit were excellent teachers and researchers; this had never been an issue.

Dr. Baker cautioned that closing the Department would not immediately save any funds; the Faculty was committed to ensuring that all students enrolled in the programs would be allowed to complete their programs, and thus there would be very little change in the near future. However, over time, as the needs of the Medical Physics program waned, colleagues would move into duties in other units and provide teaching strength in other programs.
This would ease the transition of younger colleagues into other units, since, as mentioned, it was not desirable to leave them in a unit that was disappearing, and reassignments would provide more certainty for their future. The same approach would be taken with staff currently in the unit.

These changes would result in the colleagues in the unit being more exposed to more students at an earlier stage. This would be a positive outcome for the Faculty, since many of the colleagues in the Department were strong teachers and researchers, and the Faculty would like its students to have access to them.

In more specific terms, said Dr. Baker, the proposal called for the Medical Radiation Sciences program to be administered by the new School of Interdisciplinary Science. This had been agreed to by the Steering Committee responsible for the program and had the full support of colleagues from Mohawk. Dr. Baker said he also involved the vice-president of the Medical Radiation Sciences student society in the selection of the Director of the School of Interdisciplinary Science, and she and the society's president were very supportive of the move.

The proposal also called for the School to temporarily house the Medical Physics undergraduate program. The Faculty planned to close that program, but before that occurred, the Faculty was studying how to incorporate some aspects of the program into other programs. A working group had been created to address this and there was hope for some positive integration with the Bio Physics program and with a sub-plan of the Life Sciences program. This, too, would help place colleagues in front of more undergraduate students and potentially increase the pool of applicants to their graduate program.

The graduate program would continue as it was with no changes, other than that it would be led by a Director of the Graduate Program rather than as Associate Chair. The Faculty was currently conducting a search for such a Director.

As for faculty appointments, Dr. Baker said, colleagues would have their appointments transferred to another unit. He had met with all but one colleague to determine which unit each thought would be the best fit for their interests. He was working with Chairs to accommodate these wishes, but he cautioned that he could not force any unit to accept additional faculty, so, in some cases, a colleague might have to go to a second choice. From Dr. Baker's perspective, these discussions had been going very smoothly.

Dr. Baker said he wanted to emphasize that there would be no changes to colleagues' office space, research labs, or access to facilities as a result of the change. If colleagues asked to move, the Dean's office would attempt to accommodate them, but no colleague was being asked to move from their office or lab. There would also be no change in their ability to accept or supervise grad students.

At the undergraduate level, because the Faculty was committed to ensuring current students can complete their programs, there was no expectation that Departmental teaching assignments would change immediately. However, as the Medical Physics program wound
down, colleagues might become involved with other courses, some, or possibly all, related to the revised Bio Physics Program or the sub-plan in Life Sciences.

Finally, said Dr. Baker, the Faculty had no expectation that there would be any job loss for non-academic staff. Dr. Baker said he hoped this provided some peace of mind for staff since he knew they had been concerned about the stability of the Department for the past four or five years.

Dr. McNeill was then invited to speak. She apologized if it seemed that she and other colleagues appeared not to be following the process, but, from their point of view, it had not been clear what the process was.

Right now, she said, there were 14.5 faculty members who did not know where they were supposed to go on January 1. The group was primarily physicists or engineers, and they were being told they would go to either Physics and Astronomy or the School of Interdisciplinary Science, but both units had said that they could not accommodate a lot of people. Dr. McNeill said it was like being the fat kid who’s not chosen for the team.

Dr. McNeill said the Medical Physics and Applied Radiation Sciences faculty did not want to give up graduate teaching and the School of Interdisciplinary Science was for undergraduate programs only. Physics and Astronomy had already said that it could not take 10 people, which was the number of people who would want to move to the unit.

Furthermore, the graduate program depended on the 400/600-level courses taught in Medical Physics and Applied Radiation Sciences in order to keep its accreditation this year; if the accreditation was lost, the graduate program was finished, regardless of what the Dean said.

Dr. McNeill said the Medical Physics and Applied Radiation Sciences cohort sympathized with the Dean in his efforts to deal with the Faculty’s financial problems, but, as of that day, there were a number of major issues that had not yet been resolved. The group realized that something had to go in the Faculty, and they did not relish asking Senate to vote against this proposal, but they hated to see the demise of the program in question. They felt it was very difficult to understand the full nature of the changes that would occur if this proposal was approved.

Dr. McNeill pointed out that one of the strengths of the undergraduate program was that it was unique in Canada; by making this move, the Dean would be causing a loss for the University as well as the whole country. The decision would be bad for undergraduate education, bad for graduate education, and bad for research.

Dr. McNeill concluded by stating that the Medical Physics and Applied Radiation Sciences colleagues felt there had been very little consultation with the faculty involved, despite what the Dean claimed. They would have preferred that the discussion and resolutions had been worked out better.
A member asked Dr. Baker for more clarification on the reputation of the program, which seemed to be experiencing declining enrolment. If the Faculty did not have the financial concerns it did, would the Dean still want to reallocate this group?

Dr. Baker said he would still want to reallocate. There were absolutely no concerns about the quality of the Medical Physics program -- graduates continually got in touch to say that taking the program had been the best decision they had ever made. But there were concerns about the quality of undergraduate programs across the Faculty, and it was simply the stark fact that the Faculty did not have the resources to improve them. Dr. Baker was concerned about the Faculty’s reputation should all the programs continue to suffer.

A member asked if there would be any negative consequences to deferring a decision on this closure for a few months. Dr. Baker said it was not a problem to defer for a short time, but he would like to see some closure on the issue, since it had been hanging over the heads of people involved for the last five years. He said some of the individual changes had already occurred, and he admitted that there were still some concerns about where certain faculty members would end up, but there were a number of people who were ready and, in fact, eager, to make the move.

A member asked for clarification on the number of people who would be affected -- was it 11 or 12 or 14.5? Dr. Baker said there were eight individuals who were hired by McMaster. Five individuals were employed by the Juravinski Cancer Centre; the Faculty of Science contributed funds to the Centre and they provided teaching. There were differences in the teaching loads provided by all the individuals.

A member asked Dr. Baker to confirm that the graduate program was not being phased out. Dr. Baker said the proposal was not changing anything about the graduate program. It would end up being run the way the Faculty ran its interdisciplinary programs. The implication was that, as the Medical Physics program wound down, that particular source of students would dry up, but it was not the only source available.

A member said she was worried that the decision to close the Department would set a precedent, and wondered if it would be feasible to have a wider discussion about what knowledge matters at McMaster. Closing Departments was related to how McMaster valued knowledge. Dr. Deane pointed out that Forward With Integrity had been encouraging such discussions for the past five years. Another member said that, while she supported the principle of discussing what knowledge mattered at the University, she felt that the entire University did not need to be consulted on every administrative decision. The whole enterprise would be paralyzed if leaders were not allowed to take actions forward.

A member said he felt strongly that a step back would help the situation. If a few more meetings could be held with the various stakeholder groups, perhaps concerns could be resolved and the motion could come before Senate at a later date. Dr. Deane invited the motion.

It was duly moved and seconded,
“that the Senate defer action on the proposal to terminate the Department of Medical Physics and Applied Radiation Sciences to the December meeting, with the understanding that the Dean of Science would conduct further consultation on the proposal.”

Several members said they were personally aware of how much consultation had been undertaken and felt that Dean Baker had been very thorough in the arrangement of information meetings and votes in the Faculty. Other members pointed out that all the minor details of a plan of this kind can never be worked out before the plan is implemented.

The motion to defer was then voted on and defeated, with 16 votes in favour, 28 votes against, and 1 abstention.

The main motion was then voted on and carried, with 34 votes in favour, 2 votes against, and 8 abstentions.

b. **Proposal to Establish an Honours Bachelor of Science in Neuroscience Program**

Dr. Denburg noted that the University Planning Committee reviewed and approved the above-listed program, which had received Senate approval earlier in the meeting during the presentation of the report from Undergraduate Council (agenda item VIII.b.i, above).

X **OTHER BUSINESS**

There was no other business in Open Session.

*In Closed Session, Senate:*

a. approved the Closed Session portion of the minutes of the meeting of October 14, 2015;

b. approved, on recommendation of the Committee on Appointments, the addition of a member to the selection committee for Dean and Vice-President (Health Sciences), so that the membership of the committee is as follows:

- Dr. Patrick Deane (Chair)  
  President and Vice- Chancellor
- Dr. David Wilkinson  
  Provost and Vice-President (Academic)
- Ms Jagoda Pike  
  Vice-Chair, Board of Governors
- Dr. Susan Denburg  
  Associate Vice-President (Academic), Health Sciences
- Dr. Mark Walton  
  Assistant Dean, Postgraduate Medicine; Pediatric Surgeon, Department of Surgery
- Dr. Carolyn Byrne  
  Associate Dean and Director, School of Nursing
- Dr. Patty Solomon  
  Associate Dean and Director, School of Rehabilitation Science
- Dr. John Lavis  
  Professor, Clinical Epidemiology and Biostatistics
Dr. Gerry Wright  Professor, Biochemistry and Biomedical Sciences, and Director, Michael G. DeGroote Institute for Infectious Disease Research
Dr. Cathy Risdon  Professor and Associate Chair, Education, Family Medicine
Dr. Akbar Panju  Professor and Vice-Chair, Clinical, Medicine
Dr. Mark Crowther  Professor and Chair, Pathology and Molecular Medicine
Dr. Karen Finlay  Associate Professor and Associate Chair, Education, Radiology
Dr. Jerry Hurley  Professor and Chair, Economics
Ms Debbie Martin  Assistant Vice-President / Chief Administrative Officer, Faculty of Health Sciences
Ms Amanda Lee  PhD candidate, Medical Sciences
Mr. Aditya Nidumolu  Undergraduate student, B.H.Sc. Program
Dr. Kevin Smith  Chief Executive Officer, St. Joseph's Healthcare Hamilton
Mr. Rob MacIsaac  President and Chief Executive Officer, Hamilton Health Sciences;

received, for information, the annual report on total numbers of full-time faculty and of contractually limited appointments in the seven categories of appointment;

d. approved, on recommendation of the Committee on Appointments, the following appointments, re-appointments and extensions:

- the Associate Dean, Health Professional Education, Faculty of Health Sciences, for a five-year term, effective July 1, 2015;
- the John D. Cameron Chair in the Genetic Determinants of Chronic Disease for a five-year term, effective July 1, 2015;
- the Actavis Chair in Rheumatology for Better Bone Health for a five-year term, effective July 1, 2016;
- the Director of the Institute for Multi-Hazard Systemic Risk Studies for the period October 31, 2015 to June 30, 2020;
- the Population Health Institute Chair in Diabetes Research and Care for a five-year term, effective July 1, 2016;
- Faculty Adjudicators of the Academic Integrity Policy;
- the nomination, through the President to the Board of Governors, of an Associate Professor with tenure in the Department of Materials Science and Engineering, effective January 1, 2016, which had been approved by the Committee on Appointments;

e. approved, on recommendation of the Committee on Appointments, a nomination to fill a vacancy on the Executive Committee;

f. approved the rescission of a degree and the conferral instead of a graduate diploma;
g. approved the list of fall undergraduate degree graduands from the Arts and Science Program and the six Faculties, and the fall graduands from the School of Graduate Studies;

h. received from the Committee on Appointments decisions made with respect to recommendations for tenure, tenure and promotion, continuing appointment without annual review and promotion, or continuing appointment without annual review, or permanence in the six Faculties. Senate nominated, through the President to the Board of Governors, those candidates for whom tenure and promotion, continuing appointment without annual review and promotion, or continuing appointment without annual review, or permanence had been approved;

i. received from the Committee on Appointments, for information, reports on decisions made with respect to recommendations to extend tenure-stream and contractually limited appointments in the six Faculties;

j. received from the Committee on Appointments, for information, a report on the nomination of five Senate members to serve on the Committee for Nominating a Chancellor;

k. received, for information, a report from a tribunal of the Board for Student Appeals on a recent student appeal; and

l. approved, on recommendation of the Acting Associate Vice-President and Dean of Graduate Studies, a list of candidates eligible for a McMaster Certificate of Post-Doctoral Study.
FOR INFORMATION

At its meeting of February 11, 2015, Senate, approved the establishment of two new programs, a Combined Honours Program in Arts and Science and Business and a Combined Honours Program Arts and Science and Communication Studies, on the recommendation from Undergraduate Council.

The report to Senate from Undergraduate Council, erroneously indicated that the two new programs were for inclusion in the 2016-2017 Undergraduate Calendar, whereas both programs had been approved for inclusion the 2015-2016 Undergraduate Calendar. The record should be amended to reflect the correct date.

Senate: November 11, 2015
REPORT TO SENATE

FROM THE

COMMITTEE ON BY-LAWS

At the September 9 and October 14, 2015 meetings, Senate gave approval in principle to revisions to the Faculty of Social Sciences and Faculty of Engineering by-laws, respectively, as detailed in the attached.

The Committee on By-Laws reviewed these changes by e-mail on October 28, 2015 and had no questions or concerns about the substance of the changes. They recommend a slightly more streamlined wording of the changes to section V, item vii of the Social Sciences By-laws revisions (see page 7 of Attachment I).

The Committee on By-laws therefore recommends,

"that the Senate give final approval to revisions to the Faculty of Social Sciences By-Laws as set out in Attachment I, effective November 11, 2015"

and

"that the Senate give final approval to revisions to the Faculty of Engineering By-Laws as set out in Attachment II, effective November 11, 2015."

Senate: November 11, 2015
For Final Approval
June 15, 2015

REPORT TO SENATE
FACULTY OF SOCIAL SCIENCES

Amendment to Faculty By-Laws (05-30-2014)

Amendment to the Faculty By-Laws

Graduate Curriculum and Policy Committee

A change was proposed to the faculty membership of this committee. It is proposed that the committee membership consists of one representative (normally the Graduate Chair or other faculty member responsible for graduate matters) from each Department, School, and Program offering graduate work. This is a change from the most recent by-laws for this committee that appointed the representatives elected to Graduate Council as the automatic representatives from their respective Departments, Schools or Programs. Social Sciences faculty members elected to Graduate Council can attend the Graduate Curriculum and Policy Committee but they cannot vote.

In addition, it was proposed that each student position be granted one vote.
I  GENERAL

In this document Faculty means the Faculty of Social Sciences; any reference to Departments shall also apply to the Schools and the Programs within the Faculty, and any reference to Chairs of Departments shall also include the Directors of Schools and Programs.

II  THE GENERAL FACULTY

(i)  Membership:

Ex Officio:  President
            Provost
            Vice-President (Research and International Affairs)
            Associate Vice-President and Dean of Graduate Studies
            Associate Vice-President (Academic)
            Dean of the Faculty (Chair)
            Associate Dean (Academic) of the Faculty
            Associate Dean (Graduate Studies and Research) of the Faculty
            Assistant Dean (Academic)
            Director of the Centre for Continuing Education
            University Librarian
            Registrar

Faculty:  All full-time, part-time and associate members at the rank of lecturer or higher, of the Departments of Anthropology; Economics; Health, Aging and Society; Indigenous Studies Program; Institute on Globalization and the Human Condition1 Political Science; Religious Studies; and Sociology; the School of Social Work; the School of Labour Studies; the Department of Psychology, Neuroscience and Behaviour; and the School of Geography and Earth Sciences; including those who hold joint appointments in one or more of these Departments, Schools and Programs, and including those members of the Faculty without departmental affiliation. One member from each of the other Faculties of the University.

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1 Members of the School of Geography and Earth Sciences, the Department of Psychology, Neuroscience and Behaviour, the Indigenous Studies Program and/or the Institute on Globalization and Human Condition who are not also members of a Department in the Faculty of Social Sciences are not eligible to participate in the Faculty Tenure and Promotion Committee, or in Faculty elections outlined in VI (i), (ii), and (iii).
Two part-time instructors, elected by and from the Social Sciences members of CUPE, Local #3906, Unit #2, for one-year terms.

Students: One undergraduate student, to be selected by and from the undergraduate students in each of the aforementioned Departments, Schools and Programs; and (where applicable) one graduate student to be selected by and from the graduate students in each of the aforementioned Departments and Schools; and two students selected by the Dean from the students in Level I Social Sciences.

Staff: Three members, elected by and from the regular full-time, non-teaching staff of the Faculty, for staggered two-year renewable terms.

Secretary: Secretary of the Senate and/or delegate

(non-voting)

(ii) Functions:

The General Faculty shall hold regular meetings twice a year, at which the rules of procedure of the Senate shall apply. A quorum for a regular meeting shall consist of those present at the meeting, provided that the meeting has been properly called and that regrets have not been received by the Secretary from more than fifty per cent of the members. In the absence of the Dean of the Faculty, the Chair shall be the Associate Dean, or in his/her absence, a member of the Faculty designated by the Dean.

The General Faculty may, within its area of jurisdiction and subject to the constraints imposed by its By-laws, determine the various levels of responsibility within the Faculty and establish appropriate standing and ad hoc committees of the Faculty. Under the authority of its By-laws, the General Faculty may determine the functions and powers that may be delegated to subordinate bodies.

The General Faculty delegates to the Faculty Council responsibility for the conduct of regular Faculty business subject to the following conditions and constraints.

(a) The agenda and minutes of the Faculty Council, as well as summaries of minutes of the Faculty Council and of the standing committees of Faculty (excluding the Tenure and Promotion Committee, and the Budget and Planning Advisory Committee), shall be available to all members of the General Faculty.
(b) Meetings of the Faculty Council shall be open to all members of the General Faculty as observers.

(c) At the request of the Dean of the Faculty, or of the General Faculty, or of the Faculty Council, or of any ten members of the General Faculty, an issue can be reserved for action at a special meeting of the General Faculty, for which the quorum shall be fifty members.

(d) A special meeting of the General Faculty with power to override either the Faculty Council, or any Committee of the Faculty (with the exception of the Tenure and Promotion Committee, and the Budget and Planning Advisory Committee), shall be called at the written request of ten members of the General Faculty. The quorum for such a special meeting shall be fifty members.

(e) A notice of a General Faculty meeting and an agenda shall normally be circulated to all members at least one week prior to the meeting. Any substantive change in the agenda shall be brought to the attention of members at least forty-eight hours prior to the meeting.

### III FACULTY COUNCIL

(i) **Composition:**

Ex Officio:  
- President
- Provost
- Dean of the Faculty (Chair)
- Associate Dean (Academic)
- Associate Dean (Graduate Studies and Research)
- Assistant Dean (Academic)
- Associate Vice-President and Dean of Graduate Studies, or delegate
- Chair, or delegate, from each of the Departments of Anthropology; Economics; Health, Aging, and Society; Political Science; Psychology, Neuroscience and Behaviour; Religious Studies; and Sociology
- Director of the School of Geography and Earth Sciences, or delegate
- Director of the Indigenous Studies Program, or delegate
- Director of the Institute on Globalization and the Human Condition, or delegate
- Director of the School of Social Work, or delegate
- Director of the School of Labour Studies, or delegate
- Members of the Senate elected by the Faculty
Chairs of Standing Committees of the Faculty.

Faculty: At least one, and no more than two, representatives, elected annually by and from each of the Departments, Schools and Programs (see definition on p.1) that report to the Dean of the Faculty on matters administrative.

Students: Five students elected annually by and from the student members of the General Faculty. Student members shall withdraw from meetings when the cases of specific students are under consideration.

Staff: One non-teaching staff member from the General Faculty elected by the non-teaching staff members of the General Faculty

Secretary: Secretary of the Senate and/or delegate.
(non-voting)

(ii) Functions:

To conduct the business of the Faculty subject to the conditions and constraints specified in Section II (ii).

(iii) Procedures:

In the absence of the Dean of the Faculty, the Chair shall be the Associate Dean or, in his/her absence, a member of the Faculty designated by the Dean.

A quorum shall consist of one third of the members.

IV DEAN'S OPERATING COMMITTEES

The Dean of the Faculty may appoint Dean's Operating Committees for assistance and advice in the operation of the Faculty, or as requested by the Faculty, and the Faculty shall be informed regarding the function and composition of any such committee. Such committees shall report, at least annually, to the Faculty.

All such committees shall annually review and update their operating procedures and file a copy in the Office of the Dean.
V STANDING COMMITTEES

General

(a) The President, the Provost and the Dean of the Faculty are *ex officio* members of all Standing Committees, except that the President is not an *ex officio* member of the Tenure and Promotion Committee and the Associate Dean (Academic), rather than the Dean, is an *ex officio* member of the Graduate Curriculum and Policy Committee.

(b) The Committees listed below, and such other committees as the General Faculty or Faculty Council shall establish, shall meet at the call of the Chair; unless otherwise specified in these By-laws, three voting faculty members, in addition to the Chair, and not including the President, the Provost, or the Dean of the Faculty, shall constitute a quorum.

(c) Student members of committees shall withdraw from meetings when the cases of specific students are under consideration.

(d) The Committees listed below shall report at least annually to the General Faculty.

(e) Where the Chair of a Standing Committee is to be elected from among the members, the Dean or delegate shall call the first meeting and preside until a Chair has been elected.

(i) Undergraduate Academic Planning and Policy Committee

Functions:

To advise the Associate Dean (Academic) on policy related to undergraduate academic planning, enrolment management, and student awards.

Composition:

Chair: Associate Dean (Academic)

Ex Officio: President

Provost

Dean of Faculty

Assistant Dean (Academic)

Faculty: Undergraduate Chairs of each Department, School, and Program (see definition in Section I) offering programs in which there are students who are counselled by the Associate Dean (Academic)
Students: One undergraduate student from each Department, School, and Program (see definition in Section I) offering programs in which there are students who are counselled by the Associate Dean (Academic)

Consultants: Manager of Experiential Education (non-voting) Others as necessary

(ii) **Undergraduate Admissions, Study and Reviewing Committee**

**Functions:**

To make recommendations to the Faculty Council on admissions policy; to review and approve in-course results on behalf of the Faculty; to establish and review guidelines related to the adjudication of petitions for special consideration including applications for reinstatement and requests for deferred examinations; and to adjudicate the results of formal re-readings in accordance with Section 15 of the *Student Appeal Procedures*.

**Composition:**

Chair: Associate Dean (Academic)

Ex Officio: President
Provost
Dean of the Faculty
Associate Dean and/or Assistant Dean (Academic)

Faculty: One member appointed by and from each Department, School and Program (see definition on p.1) offering programs in which there are students who are counselled by the Associate Dean (Academic), for staggered two-year terms

Consultants: Assistant Dean (Academic) (non-voting)

(iii) **Graduate Curriculum and Policy Committee**

**Functions:**

To make recommendations to the Faculty/Faculty Council on matters of graduate policy, on curriculum changes arising from consideration of departmental proposals and from the curriculum policies adopted by the Faculty, and on new
programs and fields of study arising from departmental proposals; and to deal with matters referred to it by the Committee on Graduate Admissions and Study. To report to both Faculty Council and Graduate Council at least annually. To review and update regularly its operating procedures, and file a copy with the Dean's Office and with the School of Graduate Studies.

Composition:

Chair: Associate Dean (Graduate Studies and Research)

Ex-Officio: President
Provost
Associate Vice-President and Dean of Graduate Studies
Associate Dean (Academic)

Faculty: One representative from each Department, School and Program offering Social Sciences graduate work. (Normally, the graduate chair or other faculty member responsible for graduate matters in the Department, School or Program). Each of these representatives has one vote.

Students: Two full-time graduate students, one Ph.D. student and one master's student elected annually by and from the Ph.D. and Master's students respectively. Each student representative has one vote.

Consultants: Faculty representatives to Graduate Council (non-voting)

Quorum: Two voting faculty members in addition to the Chair, and not including the President, Provost or Faculty Deans

Secretary: Graduate Registrar and Secretary of the School of Graduate Studies or delegate.

(iv) Graduate Admissions and Study Committee

Functions:
To determine the admissibility to graduate study of any applicant, on the recommendation of a department, program, school, unit or institute;

To approve each student's course program, to determine action on the recommendation of departments in instances of failure in a course, and to recommend to the Graduate Council students to receive graduate degrees;

To handle re-reads and formal inquiries as stated in the *Student Appeal Procedures* and to handle appeals and Petitions for Special Consideration as stated in the General Regulations of the Graduate Calendar;

To refer through the Graduate Curriculum and Policy Committee any matter to the General Faculty/Faculty Council or to the Graduate Council before taking action if either the Associate Vice-President and Dean of Graduate Studies or the Committee considers the matter of precedent or policy to be involved.

**Composition:**

Chair: Associate Dean (Graduate Studies and Research)

Ex Officio: President
Provost
Dean of the Faculty
Chair of the Graduate Curriculum and Policy Committee
Associate Dean of Social Sciences

Faculty: Two faculty members (who shall be members of Graduate Council) appointed by the Associate Vice-President and Dean of Graduate Studies in consultation with the Dean of the Faculty.

One member appointed by the Graduate Council to represent departments outside the Faculty.

Secretary: Graduate Registrar and Secretary of the School of Graduate Studies or delegate

(v) **Tenure and Promotion Committee**

**Functions:**

To receive from Chairs of Departments, the Director of the School of Social Work, the Director of the School of Labour Studies, and, where appropriate, the Director of the Indigenous Studies Program or Director of the Institute on
Globalization and the Human Condition, and to consider, all recommendations for the granting or withholding of tenure or permanence. For each candidate, the Committee shall recommend to the Senate Committee on Appointments that tenure or permanence be granted, or that the tenure- or teaching-track appointment be allowed to lapse, or that the period of the tenure- or teaching-track appointment be extended, or that no action be taken on the case.

To consider all recommendations for promotion received from Department Chairs, the Director of the School of Social Work, the Director of the School of Labour Studies, and, where appropriate, the Director of the Indigenous Studies Program or Director of the Institute on Globalization and the Human Condition. For each candidate, the Committee shall recommend to the Senate Committee on Appointments that promotion be granted or not be granted at this time.

The Chair shall convey the Committee's recommendations to the Senate Committee on Appointments.

Composition:

Chair: Dean of the Faculty

Faculty: Seven tenured members of the full-time faculty who are also members of the Departments and Schools which report to the Dean of the Faculty on matters administrative, elected from those holding the rank of Professor or Associate Professor. Of these at least three shall be Professors and at least one shall be an Associate Professor. They shall be elected for staggered three-year terms.

Quorum: All members but one.

vi) Multi-Media, Computing and Electronic Communication Committee

Functions:

To review and evaluate the contribution of the Faculty's computing facilities toward fulfilling the teaching, research, and administrative needs of its faculty, staff and students;

To recommend to the Dean purchases of new computing equipment to meet the requirements of the Faculty;

To consider alternative uses of the existing computing equipment better to meet the requirements of the Faculty;
To define, review and evaluate the role and responsibilities of any relevant staff under Faculty jurisdiction; and

To review and evaluate the contribution of the University's computing resources and policies toward meeting the needs of the Faculty, and propose any changes to the appropriate officer or committee.

To inform the Faculty about, and promote, appropriate use of technology in the research, teaching and administration undertaken by its faculty, staff and students.

**Composition:**

**Chair:** To be appointed by the Dean

**Ex Officio:**
- President
- Provost
- Dean of the Faculty

**Faculty:**
Four faculty members selected by the Nominating Committee, for staggered three-year terms, from the Departments, Schools, and Programs (see definition on p.1) offering programs in which there are students who are counselled by the Associate Dean.

One Faculty Instructional Assistant, selected by the Nominating Committee.

**(vii) Budget and Planning Advisory Committee**

**Function:**

To advise the Dean of the Faculty on matters of budget and related questions of short-term and long-term planning for the Faculty.

**Composition:**

**Chair:** Dean of the Faculty (Chair)

**Ex Officio:**
- President
- Provost
- Dean of the Faculty
- Associate Dean (Academic)
Chairs of Departments that report to the Dean of the Faculty on matters administrative, the Director of the School of Social Work, the Director of the School of Labour Studies, the Director of the Indigenous Studies Program and the Director of the Institute on Globalization and the Human Condition.

Director, School of Geography and Earth Sciences (for discussion of matters relating to the Faculty’s undergraduate programs)

Chair, Department of Psychology, Neuroscience and Behaviour (for discussion of matters relating to the Faculty’s undergraduate programs)

(viii) Committee to Recommend the Appointment of a Departmental Chair or a Director of a School or Program

To be constituted no later than September of the final year of the term of a chair of an academic department or of a director of a school or program. In the event of a premature vacancy, the Committee shall be constituted as soon as possible.

Function:

To recommend to the Senate Committee on Appointments the appointment of a chair of a department or a director of a school or program.

Composition:

Chair: Dean of the Faculty (Chair)

Ex Officio: Provost
Associate Vice-President and Dean of Graduate Studies

Faculty: Three faculty members from the department, school or program concerned, one from each rank of professor, associate professor and assistant professor or lecturer, elected by and from the full-time members of that rank in the department or school or program. Representation by rank may, with the approval of the Dean of the Faculty, be varied when the composition of the department or school so warrants. An incumbent chair is not eligible for election to the Committee.

One faculty member from the Faculty, but outside the department school or program concerned, appointed by the Chair of the Committee.
Students: For departments, schools or programs offering undergraduate work only, two undergraduate students who are in Levels III or IV of programs offered by the department, school or program, elected by the undergraduate students in those programs.

For departments, schools or programs offering both graduate and undergraduate work, one undergraduate student who is in Level III or IV of programs offered by the department, school or program, elected by the undergraduate students in those programs, and one full-time graduate student elected by and from the students registered in graduate degree programs in the department, school or program concerned.

Staff: One staff member from the department, school or program concerned, elected by and from the staff members in the department, school or program. To be eligible for election, a staff member should normally have at least one year of service within the department, school or program or at least two years of service within the Faculty and, in either case, there should be the expectation of continued service within the department, school or program for a year or more beyond the start of the term of the new or re-appointed department chair or director of the school or program. For this purpose, a staff member is defined as any full-time employee of the University who is not a member of the teaching staff. The election of the staff member shall be by secret ballot. Should such an election result in a tie, the tie will be resolved by random selection. The election and its resolution, when required, will be the responsibility of the Dean’s Office.

Other: One additional member may be appointed by the Chair of the Committee to reflect the interests of alumni or other external groups.

Additional Faculty: In addition, the Chair of the Committee may appoint one extra faculty member from within the department, school or program to provide representation from an unrepresented group.

Additional Staff: The Chair of the Committee may also appoint one extra staff member to the Committee, not necessarily from within the department, school or program concerned.
(ix) **Nominating Committee**

**Functions:**

To make nominations sufficient to ensure an election for representatives of the Faculty on the Graduate Council, the Undergraduate Council, and the Senate, and for members of the Tenure and Promotion Committee; to make nominations to Faculty Standing Committees, as required; to select members of the Undergraduate Hearings Committee, the Research Funding and Priorities Committee and the Teaching and Learning Committee; and to nominate Social Sciences faculty members to other Faculties in which the Faculty has representation.

**Composition:**

Chair: Dean of the Faculty

Ex Officio: President
Provost
Associate Dean (Academic)
Chairs of Departments that report to the Dean of the Faculty on matters administrative, the Director of the School of Social Work, the Director of the School of Labour Studies, the Director of the Indigenous Studies Program, and the Director of the Institute on Globalization and the Human Condition.

*Note: A call for nominations shall be issued to all faculty members each February, and faculty members shall be invited to make suggestions for nominations to the members of the Nominating Committee in advance of its annual meeting, which shall replace a meeting of the Budget and Planning Advisory Committee.*

**VI ELECTIONS**

(i) Elections shall be held before the end of April each year to fill vacancies on Faculty Standing Committees, as required, and on the Faculty Tenure and Promotion Committee. The Nominating Committee's nominations for these positions shall be mailed to the eligible voters, at their University addresses, giving them the opportunity to nominate, within a designated period, additional
candidates for any vacancy, any such nomination to have the consent of the nominee and to be supported by five eligible voters. The elections shall be conducted by the Secretary of the Senate by means of ballots mailed to the University address of each eligible voter. The electorate for the Tenure and Promotion Committee shall consist of all full-time members of the Faculty (see definition II(i)).

(ii) The Nominating Committee shall nominate a representative of the Faculty of Social Sciences, for a three-year renewable term, to each of the other Faculties in which the Faculty of Social Sciences has representation. Additional nominations may be made by members of the Faculty of Social Sciences, within a designated period, any such nomination to be supported by five members of the Faculty of Social Sciences. If an election for any of these representatives should be necessary, it shall be held concurrently with the elections alluded to in Section VI(i) above.

(iii) Elections shall be held before the end of April each year to fill Faculty vacancies on the Graduate Council, the Undergraduate Council and the Senate. The Nominating Committee's nominations for these positions shall be provided to the eligible voters, giving them the opportunity to nominate, within a designated period, additional candidates for any vacancy, any such nomination to have the consent of the nominee and to be supported by five eligible voters. The elections shall be conducted by the Secretary of the Senate by means of ballots provided to each eligible voter. The electorate shall consist of all part-time and full-time members, at the rank of lecturer or higher of each Department, Program and School that reports to the Dean of the Faculty on matters administrative (see definition II(i)).

(iv) All elections (unless otherwise specified) shall be conducted in accordance with the single transferable vote procedure.

(v) If any of the elected positions referred to in VI(i) and VI(ii), except a position on the Tenure and Promotion Committee, becomes vacant, the Faculty Council shall have the power to fill this position for the remainder of the session.

(vi) In the election of members to the Faculty Tenure and Promotion Committee and the Senate, eligible voters shall be provided with a modified curriculum vitae of each candidate, which should not exceed one page, and should include degrees, dates and ranks of appointments, lists of representative publications or other scholarly works, and relevant experience.

(vii) Retiring members of all Standing Committees shall be replaced by newly-elected or appointed members on July 1 of each year, except for the Undergraduate
Awards and Scholarships Committee. For this Committee, retiring members shall be replaced by newly-appointed members on November 1 of each year.

(viii) The conduct of the election of the regular full-time, non-teaching staff members of the Faculty shall be carried out by the Office of the Dean. Any member of the non-teaching staff who is eligible to vote may be nominated as a candidate for election, provided written consent has been filed with the Office of the Dean and the nomination paper has been signed by two members of the non-teaching staff eligible to vote. The election, if necessary, shall be conducted by means of ballots mailed to the University address of each regular full-time, non-teaching staff member of the Faculty. The candidate(s) receiving the most ballots shall be declared elected.

VII AMENDMENTS TO THE BY-LAWS

(i) Any amendment to these By-laws shall require the approval of the Senate.

(ii) A recommendation to the Senate for any amendment to the By-laws or for any new By-law, shall be made only after the proposed change in the By-laws has been approved at a Faculty meeting. Notice of motion to request such amendment shall be given at a previous meeting of the Faculty, or in writing to all members of the Faculty at least four weeks before the Faculty meeting.

MEMORANDUM

Date: September 22, 2015

To: Helen Ayre, University Secretariat

From: Ishwar Puri, Dean and Professor

SUBJECT: Amendments to Engineering By-laws

Further to my memo dated April 28th regarding the Faculty of Engineering By-law changes, I wish to inform you that a few more changes should have been captured regarding the Engineering Graduate Society. These changes were approved at the Dean’s Council meeting on Tuesday, March 10, 2015 and the general meeting of the Faculty on Wednesday, March 25, 2015.

Attached please find a copy of the Engineering By-laws containing the changes that were approved, however, not captured in my original memo. Full details are provided below.

Changes include the following:

- The Faculty of Engineering, Page 2, item (i) d: Students - Omit 2nd paragraph

  “Three graduate students, selected annually by and from the elected graduate student departmental representatives on the Graduate Curriculum and Policy Committee”

  Replace with:
  “The president of the Engineering Graduate Society and two graduate students, selected annually by and from the students sitting on the Engineering Graduate Society Council.”

- Graduate Curriculum and Policy Committee - Page 10
  Top of Page 10-Students. Omit the following paragraph
“One engineering graduate student from each department and school offering graduate work in the Faculty, to be elected annually by the Engineering Graduate Society. These students shall annually select two of their number (at least one of whom shall be a Ph.D. student) to be the Engineering representatives on Graduate Council, three of their number to be the graduate student members of the Faculty, and two of their number to serve on the Faculty’s Student and Professional Affairs Committee”

Replace with:

“One Engineering graduate student from each department and school currently offering graduate work in the Faculty. Students currently sitting on the Engineering Graduate Society Council will represent their department or school on the committee. If no representative is available from the Engineering Graduate Society Council one will be appointed from the department or school by the Engineering Graduate Society Council in conjunction with the department or school’s administration.”

- **Student and Professional Affairs Committee -Page 12-Students**

  Omit:
  “Two graduate students, chosen by the Engineering Graduate Society”

Replace with:

“Two graduate students, appointed by the Engineering Graduate Society from the students sitting on the Engineering Graduate Society Council.”

- **Elections, Page 19**

At the bottom of the section on Page 19 add the following item:

(xii) **Elections of the student members to the Graduate Council is shall be held before the end of August. The Engineering Graduate Society Council shall provide the student members for the Graduate Council in accordance with bylaws of the Engineering Graduate Society and the Senate.**

Thank you.
1 THE FACULTY OF ENGINEERING

(i) Membership

(a) Ex Officio: President
    Provost
    Vice-President (Research and International Affairs)
    Dean of the Faculty (Chair)
    Associate Deans of the Faculty
    Assistant Dean (Studies)
    Associate Vice-President and Dean of Graduate Studies or delegate
    Director, Engineering and Management Program
    Director, Engineering and Society Program
    Director, School of Biomedical Engineering
    Director, School of Computational Engineering and Science
    Director, School of Engineering Practice
    Directors of Senate-approved Offices, Centres and Institutes in which Engineering is involved (see Schedule A)
    Chairs of the Departments of Chemistry, Mathematics and Statistics, and Physics and Astronomy
    Director, Engineering I Program
    Director of Administration
    Director, School of Engineering Technology

(b) Faculty: All faculty members holding appointment at the rank of Lecturer or higher in the Departments of Chemical Engineering, Civil Engineering, Computing and Software, Electrical and Computer Engineering, Engineering Physics, Materials Science and Engineering and Mechanical Engineering, as well as in the Walter G. Booth School for Engineering Practice, the School of Engineering Technology, and in such other Departments, schools and programs as may be added to the Faculty of Engineering by the Senate

One faculty member from each of the other Faculties
Such other faculty members, holding full-time appointments, as shall from time to time be designated by the Faculty of Engineering to hold membership, for any period designated by the Faculty, by virtue of their responsibilities for, or interest in, the work and the students of the Faculty

(c) Staff: Three full-time staff members in the Faculty of Engineering, elected for two-year terms, one to be elected by and from each of the following groups: Professional/Management, Technical, and Clerical/Secretarial

(d) Students: The President of the McMaster Engineering Society and four undergraduate students, elected annually by and from the full-time undergraduate students in the Faculty of Engineering

Three graduate students, selected annually by and from the elected graduate student-Departmental representatives on the Graduate Curriculum and Policy Committee

The president of the Engineering Graduate Society and two graduate students, selected annually by and from the students sitting on the Engineering Graduate Society Council.

Students may be asked to withdraw when the cases of specific students are under consideration, but on other matters they shall have full voting privileges.

(e) Secretary: Secretary of the Senate or delegate

(f) Consultants: Registrar

Associate/Assistant Registrar (Admissions and Liaison) or delegate

Co-ordinator of Part-time Degree Studies

Director of the Centre for Continuing Education

Manager, Environmental and Occupational Health Support Services
(ii) Regular Meetings

(a) The Faculty shall meet at least five times during the period September to June, inclusive. A notice of meeting shall normally be circulated at least one week before a meeting, and an agenda shall be circulated not less than forty-eight hours before a meeting.

(b) Meetings of the Faculty shall be conducted in accordance with the rules and procedures of the Senate with the provision that matters related to individual cases or records be dealt with in Closed Session.

(c) A quorum shall consist of those present at the meeting, provided that the meeting has been properly called and that regrets have not been received by the Secretary from more than one half of the members of the Faculty. However, for action on items not on the circulated agenda, a quorum shall consist of one half of the members of the Faculty.

(d) In the absence of the Dean of the Faculty, the Chair shall be the Associate Dean (Academic) of the Faculty or, in his/her absence, a member of the Faculty designated by the Dean.

(iii) Special Meetings

Special meetings may be called, under the same conditions of notice and agenda, at the request of the Dean of the Faculty or upon the submission of a written request to the Dean by ten or more voting members of the Faculty.

(iv) Authority of the Faculty

(a) The Faculty shall, within its area of jurisdiction and subject to the constraints imposed by these By-laws, determine the various levels of responsibility within the Faculty and establish appropriate Standing and Ad Hoc Committees.

(b) Under the authority of these By-laws, which are subject to approval and amendment by the Senate, the Faculty shall determine the functions and powers that may be delegated to subordinate bodies.
II  DEAN’S COUNCIL

Functions:

To deal with such matters as may be referred to it by the Dean of the Faculty or by the Faculty; to act on behalf of the Faculty in the period between the last regular Faculty meeting of one academic year and the first regular Faculty meeting of the succeeding academic year, submitting a written report to the Faculty at that latter meeting on all actions taken; to advise the Dean on matters of concern; to make recommendations to the Faculty on any appropriate matter.

To do short-term and long-term planning for the Faculty; to establish the objectives and priorities of the Faculty within the context of a comprehensive Faculty plan and in consultation with the individual Departments in the Faculty and its programs and schools; to be responsible for the planning of the Faculty’s physical facilities and services.

To act as a nominating committee, as set out in Sections V (i) and V (ii) below.

Composition:

Chair:  Dean of the Faculty

Ex Officio:  President
            Provost
            Associate Deans of the Faculty
            Assistant Dean (Studies)
            Any Engineering faculty member(s) elected to the University Planning Committee
            Director, Engineering and Management Program
            Director, Engineering I Program
            Director, Engineering and Society Program
            Director, School of Biomedical Engineering
            Director, School of Computational Engineering and Science
            Director, School of Engineering Practice
            Chairs of Departments in the Faculty
            Director of Administration
            Director, School of Engineering Technology

Secretary:  Secretary of the Senate or delegate

(non-voting)
III  DEAN'S OPERATING COMMITTEES

The Dean of the Faculty may appoint Dean's Operating Committees for assistance and advice in the operation of the Faculty, or as requested by the Faculty, and the Faculty shall be informed regarding the function and the composition of any such committees. Such committees shall report, at least annually, to the Faculty.

All such committees shall annually review and update their operating procedures and file a copy in the Office of the Dean.

IV  STANDING COMMITTEES

General

The President, the Provost, and the Dean of the Faculty are *ex officio* members of all Standing Committees, except that the President and Provost are not *ex officio* members of the Tenure and Promotion Committee.

The Standing Committees listed below, and such other committees as the Faculty or the Dean’s Council may establish, shall meet at the call of the Chair. With respect to the Committees that hear certain student appeals and cases of alleged academic dishonesty, the Senate policies governing such hearings shall prevail. Student members of committees may be asked to withdraw when cases of specific students are under consideration.

Unless otherwise specified, a quorum shall consist of one half of the voting committee members.

Any of the Standing Committees may establish sub-committees. The Chairs of any such sub-committees shall be appointed by the Committee, normally from among its members.

All Standing Committees shall annually review and update their operating procedures, and file a copy in the Office of the Dean.

All Standing Committees shall report to the Faculty at least annually.
(i) **Undergraduate Recruiting and Admissions Committee**

Functions:

1. To make recommendations for the Faculty on admission of applicants to Level I; to make recommendations to the Faculty on undergraduate admissions policy;

2. To plan, for approval by the Faculty, the secondary school student liaison and recruitment activities; to assist in the organization of, and to attend, Faculty-approved events (e.g. Experience Weekend, Discovery Days, design competitions, Open House, Science and Engineering Fairs, etc.) for recruiting of students.

Composition:

Chair: Director, Engineering I Program

Ex Officio: President
Provost
Dean of the Faculty
Associate Dean (Academic) of the Faculty
Assistant Dean (Studies)
Director, Engineering and Management Program
Director, Engineering and Society Program
Manager, Engineering Co-Op and Career Services and Internship Program
Student and Alumni Liaison Officer
Associate Registrar (Liaison and Admissions)
Assistant Registrar (Liaison)

Faculty: One member selected by and from each Department in the Faculty
One member selected by and from the School of Engineering Technology

Student: President, McMaster Engineering Society (MES) (or delegate)
One undergraduate student appointed annually by the Dean

Consultants: Director of Administration
Director, Alumni Advancement (or delegate)
Representatives of other Faculties and groups as required
High School Teacher/Counsellor, appointed by the Dean of the Faculty (as required)

Secretary: To be provided by the Office of the Associate Dean (Academic) of the Faculty
(ii) **Undergraduate Reviewing Committee**

**Functions:**

To review, at the end of an academic session, the grades of all students registered in undergraduate programs in the Faculty of Engineering; to make recommendations to the Faculty concerning the status of in-course students; and to recommend to the Faculty candidates for undergraduate degrees.

**Composition:**

Chair: Associate Dean (Academic)

Ex Officio: President
Provost
Dean of the Faculty
Assistant Dean (Studies)
Director, Engineering I Program
Director, Engineering and Management Program
Director, Engineering and Society Program

Faculty: One member selected by and from each Department in the Faculty
One member selected by and from the School of Engineering Technology

Consultants: Associate Registrar (Records and Registration)
(non-voting) Faculty of Engineering Undergraduate Student Advisor

(iii) **Undergraduate Curriculum and Policy Committee**

**Functions:**

To make recommendations to the Faculty on all matters of curriculum policy, including consideration of the requirements of the Canadian Engineering Accreditation Board; to make recommendations on curriculum changes to the Faculty, arising from the consideration of Departmental proposals and from the curriculum policies adopted by the Faculty; to report to the Faculty on the curricula of programmes in the Faculty; to ensure that the undergraduate calendar contains up-to-date programme curricula; to consider and make recommendations to the Faculty concerning course evaluation procedures, and to review the effectiveness of such evaluations.

**Composition:**
Chair:  Associate Dean (Academic)

Ex Officio:  President
            Provost
            Dean of the Faculty
            Assistant Dean (Studies)
            Director, Engineering and Management Program
            Director, Engineering and Society Program
            Director, Engineering I Program
            Director, School of Engineering Technology

Faculty:  One member selected by and from each Department in the Faculty, such member normally to be the Chair of the Departmental Undergraduate Curriculum Committee or equivalent

Two members selected by and from the School of Engineering Technology, one to represent the four-year programs, one to represent the degree completion programs

Student:  One undergraduate student appointed annually by the Dean of the Faculty

Consultants:  The member of Undergraduate Council elected by the Faculty
(non-voting)

Secretary:  To be provided by the Office of the Associate Dean (Academic)
(non-voting) of the Faculty

(iv) Undergraduate Student Awards Committee

Functions:

To make recommendations to the Undergraduate Council for the award of prizes and scholarships restricted to undergraduate students in the Faculty of Engineering; to prepare information for the use of committees responsible for university-wide awards such as the Chancellor’s Gold Medal and the Governor General’s Medal; to make recommendations to the Undergraduate Council concerning the establishment of new awards and other related matters; to rank the applicants for other competitive awards; and to initiate and coordinate Faculty-sponsored events which recognize academic excellence.
Composition:

Chair: To be appointed by the Dean of the Faculty in consultation with Dean’s Council

Ex Officio: President
Provost
Dean of the Faculty
Associate Dean (Academic)

Faculty: Three or more members, representing at least three Departments in the Faculty, appointed by the Dean in consultation with Dean’s Council

Consultants: Director, Student Financial Aid and Scholarships
(non-voting) Director of Administration
The Committee shall have power to add additional members, including non-faculty members, where such are needed to meet the requirements attendant on making an award.

(v) Graduate Curriculum and Policy Committee

Functions:

To make recommendations to the Faculty on matters of graduate policy, on curriculum changes arising from consideration of Departmental proposals and from the curriculum policies adopted by the Faculty, and on new Programs and fields of study, arising from Departmental proposals; and to deal with matters referred to it by the Graduate Admissions and Study Committee.

Composition:

Chair: Associate Dean of Graduate Studies (Engineering)

Ex Officio: President
Provost
Dean of the Faculty
Associate Dean (Academic)
Associate Vice-President and Dean of Graduate Studies

Faculty: One member selected by and from each Department offering graduate work in the Faculty
One member selected by and from each of the Schools offering graduate programs in the Faculty
Students: One Engineering graduate student from each department and School offering graduate work in the Faculty, to be elected annually by the Engineering Graduate Society. These students shall annually select two of their number (at least one of whom shall be a Ph.D. student) to be the Engineering representatives on Graduate Council, three of their number to be the graduate student members of the Faculty, and two of their number to serve on the Faculty’s Student and Professional Affairs Committee.

One Engineering graduate student from each department and school currently offering graduate work in the Faculty. Students currently sitting on the Engineering Graduate Society Council will represent their department or school on the committee. If no representative is available from the Engineering Graduate Society Council one will be appointed from the department or school by the Engineering Graduate Society Council in conjunction with the department or school's administration.

Consultants: The three members of the Graduate Council elected by the Faculty (non-voting)

Secretary: Secretary of the School of Graduate Studies or delegate (non-voting)

(vi) Graduate Admissions and Study Committee

Functions:

To rule on the admissibility of applicants to graduate Programs in the Faculty; to oversee the progress of students in course; to recommend to the Graduate Council, and to report to the Faculty, students to receive graduate degrees; to refer, before taking action, to the Graduate Curriculum and Policy Committee, any matter deemed by either the Associate Vice-President and Dean of Graduate Studies or the Committee to involve matters of precedent or policy; and to consider and make decisions on petitions from graduate students with respect to off-campus or part-time study, extension of time to complete degree requirements, etc.

Composition:

Chair: Associate Dean of Graduate Studies (Engineering)

Ex Officio: President
            Provost
            Dean of the Faculty
Associate Vice-President and Dean of Graduate Studies

Faculty:
One member selected by and from each Department offering graduate work in the Faculty
One member appointed by the Graduate Council from Departments other than those of the Faculty
One member selected by and from each of the Schools offering graduate work in the Faculty

Consultant:
Chair of the Graduate Curriculum and Policy Committee
(non-voting)

Secretary:
Secretary of the School of Graduate Studies or delegate
(non-voting)

(vii) **Student and Professional Affairs Committee**

**Functions:**

To initiate short-term and long-term planning, and to recommend to the Faculty policies and actions regarding: relations among the faculty, students and alumni; improving student engagement; student employment and career development; interactions with industry, governmental bodies, professional organizations, professional societies, and the general public; and professional development and continuing education.

**Composition:**

Co-Chairs:
Dean of the Faculty or delegate
President, McMaster Engineering Society

Ex Officio:
President
Provost
Associate Dean (Academic)
Associate Dean of Graduate Studies (Engineering)
Director, Engineering I Program
Director, Engineering and Management Program
Director, Engineering and Society Program
Director, School of Biomedical Engineering
Director, School of Computational Engineering and Science
Director, School of Engineering Practice
Director, School of Engineering Technology
Manager, Engineering Co-Op and Career Services and Internship Program
Manager, Engineering Alumni Office
Director of Administration
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<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Faculty</td>
<td>Two members of Departments not represented by the <em>ex officio</em> members, to be selected by the Dean.</td>
</tr>
<tr>
<td>Students</td>
<td>Eight undergraduate students chosen by the McMaster Engineering Society Executive, representing the leadership of student clubs and teams. Two graduate students, chosen by the Engineering Graduate Society.</td>
</tr>
<tr>
<td></td>
<td><em>Two graduate students, appointed by the Engineering Graduate Society from the students sitting on the Engineering Graduate Society Council.</em></td>
</tr>
<tr>
<td>Alumni</td>
<td>President, McMaster Engineering Alumni Branch, or delegate</td>
</tr>
</tbody>
</table>

(viii) **Tenure and Promotion Committee**

**Functions:**

To receive from Chairs of Departments, and to consider, all recommendations for the granting or withholding of tenure or permanence. For each candidate, the Committee shall recommend to the Senate Committee on Appointments that (a) tenure or permanence be granted, (b) the appointment be allowed to lapse, (c) the period of the appointment be extended, or (d) no action be taken on the case.

To receive from Chairs of Departments, and to consider, all recommendations for promotion, and to recommend to the Senate Committee on Appointments the granting or withholding of promotion.

**Composition:**

**Chair:** Dean of the Faculty

**Faculty:** Six tenured members of the full-time rank elected from those holding the rank of Professor or Associate Professor. Of these, at least three shall be Professors and at least one shall be an Associate Professor. They shall be elected for staggered three-year terms by the full-time members of the faculty.

**Quorum:** Faculty Dean and the rest of the Committee save one.
(ix) (a) Faculty Joint Health and Safety Committee

Functions:

For all buildings and areas under the control of the Faculty:

to receive information on safety and hazards from the University and other sources, and disseminate it to faculty members, staff and students as needed;

to provide advice to the Dean of the Faculty, Department Chairs, faculty members, staff or students, wherever appropriate, concerning potential hazards;

to assist in formulating policy relating to the safe conduct of undergraduate laboratories and research laboratories, in consultation with teaching assistants, graduate students, and research staff;

to monitor compliance by McMaster University with the spirit and the letter of the Ontario Occupational Health and Safety Act and other relevant legislation, and to report to the Dean of the Faculty on any departure from the above, for action;

to remind all employees, including teaching assistants, of their rights and responsibilities under the Ontario Occupational Health and Safety Act and other relevant legislation; and,

to represent the Faculty of Engineering legally in all matters of health and safety designated under the Occupational Health and Safety Act.

Composition:

Co-Chairs: One to be appointed by the Dean of the Faculty
One to be selected by and from the elected Committee members

Ex Officio: President
Provost
Dean of the Faculty

Members: One employer-designated member from each Department/Unit
One elected committee member from the Health and Safety Committee of each Department/Unit, selected by the elected members of the Department/Unit

Additional members as may be appointed by the Co-Chairs, in consultation with the Dean, from other groups which use the facilities of the Faculty of Engineering, as long as the total number of elected members on the Committee comprises at least 50% of the Committee membership

Consultants:
(non-voting) Manager, Environmental and Occupational Health Support Services
Safety Specialist, Environmental and Occupational Health Support Services
Additional resource persons appointed by the Co-Chairs as required by the legislation

Secretary: Assigned by Dean’s Office
(non-voting)

(b) Department/Unit Health and Safety Committees

Functions:

To provide advice to the Department Chair or Unit Director concerning health and safety matters having to do with the safe conduct of undergraduate laboratories and all research activities at the Department/Unit level and to report to the Department Chair or Unit Director on potential hazards; to conduct safety surveys within the Department/Unit in accordance with the Ontario Occupational Health and Safety Act; and to provide representation to the Faculty Joint Health and Safety Committee

Composition:

Co-Chairs: One person to be appointed by the Department Chair/Unit Director from among the faculty members in that Department/Unit
One person to be selected by and from the non-supervisory employees

Ex Officio: President
Provost
Dean of the Faculty
Members: One or more non-supervisory employees to be elected by and from the non-supervisory employees of the Department/Unit, one of whom shall be a non-supervisory technician.

One graduate student to be elected by and from the graduate students in the Department/Unit.

One person to be appointed by the Department Chair or Unit Director from among the employed members of the Department/Unit.

(x) Faculty Awards Committee

Functions:

To encourage, develop and promote applications for prestigious awards for Engineering faculty. Awards can be international, national or specific to the University. Such awards include, but are not limited to, the Killam Award, membership in the Royal Society of Canada, membership in the Canadian Academy of Engineers, the NSERC Steacie Award and the 3M Teaching awards. To encourage and develop applications for prestigious awards to alumni and friends of the Faculty. The Committee will work with the Faculty Advancement Officer to ensure that awards recipients are appropriately recognized within the Faculty.

Composition:

Chair: Associate Dean, Research and External Relations

Ex Officio: President
           Provost
           Dean of the Faculty

Members: One faculty member from each academic Department

Secretary/Consultant: Advancement Officer of the Faculty of Engineering

(xi) Faculty Committee on Scholarships

Functions:

To rank scholarship applicants in compliance with the eligibility criteria and selection instructions of the Tri-Council agencies (NSERC, CIHR and SSHRC) and Ontario Ministry of Training, Colleges and Universities.
Composition:

Chair: Associate Dean of Graduate Studies, Engineering

Ex Officio: Dean of the Faculty

Members: Two faculty members per Department with one-year terms nominated by Departmental Chairs

(xi) Engineering and Management Operating Committee

Functions:

To develop curriculum recommendations for the Engineering and Management program to the Undergraduate and Curriculum Policy of the Faculty of Engineering, and the Faculty of Business where appropriate.

To work closely with the Engineering and Management Industrial Advisory Council by seeking advice on the continuing development of the Engineering and Management program and career development component of the program.

Composition:

Chair: Director, Engineering and Management Program

Ex Officio: President
Provost
Dean, Faculty of Business
Dean, Faculty of Engineering
Associate Dean (Academic), Faculty of Business
Associate Dean (Academic), Faculty of Engineering

Faculty: Seven faculty members from each of the Faculties of Business and Engineering, representing the different Departments and Areas, to be appointed by their respective Deans on the recommendations of their Department or Area Chairs, for staggered three-year terms

Students: One undergraduate student, registered in the Engineering and Management program, to be appointed by both Deans on the recommendation of the executives of the McMaster Engineering and Management Society, for a one-year term

Consultants: Assistant Dean (Studies), Faculty of Engineering (non-voting) Manager, Academic Programs Office, at the Faculty of Business Resource Staff, as appropriate
Secretary: Program Co-ordinator, Engineering and Management Program
(non-voting)

(xiii) Engineering and Management Policy Committee

Functions:

To consider and make recommendations regarding the operation of the
Engineering and Management Program; to recommend, to the appropriate
Faculty committees, policy on admission numbers and major Program changes;
and to consider proposals from the Director requiring policy decisions.

Composition:

Chair: Dean of the Faculty of Engineering and Dean of the Faculty of
Business, alternately, for two-year terms

Ex Officio: President
Provost
Dean of the Faculty of Business, when not serving as Chair
Dean of the Faculty of Engineering, when not serving as Chair
Director, Engineering and Management Program
Associate Dean of Business (Academic)
Associate Dean (Academic) of Engineering

Secretary: Administrator, Engineering and Management Program
(non-voting)

(xiv) Engineering and Society Policy Committee

Functions:

To consider and make recommendations regarding the operation of the
Engineering and Society Program; to make recommendations, to the appropriate
Faculty committees, on policy changes; and to consider proposals from the
Director requiring policy decisions.

Composition:

Chair: Dean of the Faculty

Ex Officio: President
Provost
Director, Engineering and Society Program
Associate Dean (Academic)
One member to be appointed by the Director
V ELECTIONS

(i) Elections of Faculty of Engineering representatives to the Senate, the Graduate Council, and the Undergraduate Council, and to fill vacancies on the Faculty's Standing Committees, shall be held before the end of April each year. The Dean's Council shall prepare sufficient nominations to ensure an election for all such positions. The nominations shall be mailed to all members of the electorate, at their University address, giving members the opportunity to nominate, within a designated period, additional candidates for any vacancy, any such nominations to be supported by five members of the electorate. The elections shall be conducted by the Secretary of the Senate by means of ballots mailed to the University address of each member of the electorate.

(ii) The Dean's Council shall nominate a representative of the Faculty of Engineering, for a three-year renewable term, to each of the other Faculties in which the Faculty of Engineering has representation. Additional nominations may be made by members of the Faculty of Engineering within a designated period, any such nomination to be supported by five members of the Faculty of Engineering. If an election for any of these representatives be necessary, it shall be held concurrently with the election of members of Standing Committees.

(iii) Appointments to all Standing Committees from Departments shall be forwarded by the Department Chairs to the Dean prior to July 1 of each year.

(iv) The electorate shall consist of all faculty members holding the rank of Lecturer and above in Departments in the Faculty of Engineering, except insofar as the electorate for the Tenure and Promotion Committee is restricted by Senate to full-time faculty members.

(v) All elections shall be conducted in accordance with the single transferable vote procedure.

(vi) In the election of faculty members from the Faculty of Engineering to the Senate, of the three allotted seats, at least one shall be filled by a professor and at least one by an associate or assistant professor.

(vii) The conduct of the election of undergraduate students to the Faculty is the responsibility of the Dean of the Faculty, who will normally delegate the task to the McMaster Engineering Society, in consultation with the Associate Dean (Academic).

(viii) In the election of staff members to the Faculty, of the three allotted seats, one shall be filled for each of the following categories: professional/management, technical and clerical/secretarial. Elections shall be conducted by the Office of the Dean.
(ix) If a position on a standing committee, except for the Tenure and Promotion Committee, becomes vacant, the Faculty Council may fill that position for the remainder of the term. In the case of the Tenure and Promotion Committee, a by-election shall be held to fill the position for the remainder of the term.

(x) All committee memberships shall take effect from July 1, with the exception of the Undergraduate Hearings Committee, for which membership will take effect from September 1.

(xi) The terms of office of Standing Committee members and Chairs shall normally be two years, staggered, unless otherwise specified.

(xii) *Elections of the student members to the Graduate Council shall be held before the end of August. The Engineering Graduate Society Council shall provide the student members for the Graduate Council in accordance with bylaws of the Engineering Graduate Society and the Senate.*

VI AMENDMENTS TO THE BY-LAWS

(i) Any amendment to these By-laws shall require the approval of the Senate.

(ii) A recommendation to the Senate for any amendment to any By-law, or for any new By-law, shall be made only after the proposed change in the By-laws has been approved at a meeting of the Faculty. Notice of motion to request such amendment shall be given at a previous meeting of the Faculty, or in writing to all members of the Faculty at least four weeks before the Faculty meeting.

VII IMPLEMENTATION

The date of effect for these By-laws, and any amendments thereto, shall be the date on which they receive the approval of the Senate.

**Approved by Senate:** June 9, 1982

**Amended:**

Faculty of Engineering By-laws: Schedule A

Senate approved Offices, Centres and Institutes in which the Faculty of Engineering is involved:

Brockhouse Institute for Materials Research
Centre for Advanced Polymer Processing and Design
Centre for Effective Design of Structures
Centre for Emerging Device Technologies
Centre for Research in Micro-and-Nano-Systems
Dofasco Centre for Engineering and Public Policy
GMC Centre for Automotive Materials and Corrosion
GMC Centre for Engineering Design
McMaster Centre for Pulp and Paper
McMaster Centre for Software Certification
McMaster Centre for Automotive Research and Technology (MacAUTO)
McMaster Institute for Energy Studies
McMaster Institute for Polymer Production Technology
McMaster Manufacturing Research Institute
Software Quality Research Laboratory
Steel Research Centre
Xerox Centre for Engineering Entrepreneurship and Innovation
Office of International Affairs
Results of the Fall 2015 Elections to Senate

The following student representatives were elected to Senate in the October 2015 elections. The term of office for each position is indicated.

Undergraduate Student Representatives:

**Faculty of Business:**
No nominations received.  

**Faculty of Science:**
Ms Veronica van der Vliet  Level 2  Integrated Science  

July 1, 2015-June 30, 2016

Graduate Student Representatives:

**Faculty of Health Sciences:**
Mr. Siddhartha Nath  Year 3  M.D./Ph.D.  

July 1, 2015-June 30, 2016

**Faculty of Humanities:**
Mr. Peter Gardhouse  Year 1  History, M.A. Candidate  

July 1, 2015-June 30, 2016

**Faculty of Social Sciences:**
No nominations received.  

July 1, 2015-June 30, 2017
November 5, 2015

TO:        Members and Observers of the McMaster University Senate

FROM:      Helen Ayre
           University Secretary

RE: Confidentiality of Senate and Senate Committee Discussions

For many years there has been an annual reminder to members of Senate and Senate committees of their responsibilities in terms of confidentiality.

The operation of the Senate is governed by The McMaster University Act, 1976 and the Senate By-laws. Much of Senate’s business is conducted in Open Session and that part of each Senate meeting may be attended by any member of the University or the wider community. Matters discussed in Open Session are not confidential and the record of Senate’s Open Session proceedings is available to the general public.

The University Act, however, provides for certain matters to be dealt with in Closed Session, i.e., “matters confidential to the University” and “matters of a personal nature concerning an individual.” Items discussed in the Closed Session portion of Senate meetings are confidential and are not to be divulged to anyone not entitled to be present. This rule applies also to the meetings of Senate committees and boards (Senate By-law 2[xii]). The University is now also governed by Ontario’s Freedom of Information and Protection of Privacy Act (RSO 1990) (FIPPA). Despite the provisions of this Act with respect to Freedom of Information, the substance of Closed Session discussions are normally exempt from disclosure. This Act does, however, impose on the University an even greater level of accountability with respect to the protection of confidential information about individuals.

Senate members and observers are urged to treat Closed Session discussions and materials with the necessary confidentiality, not only to protect the individuals whose names may be mentioned, but also to provide an atmosphere in which Senate and committee members may engage in frank debate on what are sometimes very sensitive issues. In this way, the dignity and authority of the Senate will not be undermined and the decisions made will more likely be based on full and candid discussion.
McMaster University is one of a number of Canadian universities to announce it will terminate its licence agreement with Access Copyright, a copyright collective that provides licences to make copies from print and digital works such as books, magazines, newspapers and journals.

McMaster will not renew its current licence when it expires on December 31, 2015. The final decision was made by the Provost and Vice-President Academic, in consultation with McMaster’s Copyright Advisory Group, legal counsel, the University Library and other McMaster stakeholders.

The University will continue its commitment to copyright compliance, which is an ongoing legal duty and an integral component of academic integrity. Over the coming weeks, more information will be released around newly developed internal resources which will become available to assist staff and faculty with clearing necessary copyright permissions, to ensure all are aware of their rights and responsibilities under the University’s Fair Dealing Policy and the Copyright Modernization Act. (Bill C-11).

It is particularly important that instructors preparing coursepacks for the Winter 2016 term send their coursepack adoptions into the Campus Store as soon as possible, since it may take longer to obtain copyright permissions during this transition period. These coursepack adoptions can be emailed to Linda Colarusso at colarus@mcmaster.ca.

More information can be found at http://copyright.mcmaster.ca. Questions can be sent to copyright@mcmaster.ca.
At its meeting on October 20th 2015 Graduate Council approved the following for recommendation to Senate:

For Approval:
1. Faculty of Engineering
   
   Chemical Engineering
   **Cancellation of M.Eng. Program**
   The department proposed cancelling their M.Eng. program. There has been no student enrollment in several years and they would like to focus their attention on the M.A.Sc. and Ph.D. degrees they offer. They note that the need for faculty to supervise the project component of the degree is highly time-consuming but has minimal potential benefits relative to the M.A.Sc. program. The fact that the M.Eng. is still listed with no intake creates confusion both administratively and for students who apply to the M.Eng. when they were intending to take a thesis-based Masters.

2. Faculty of Social Sciences

   Social Work
   **New Stream in MSW - Critical Leadership in Social Services and Communities**
   The School of Social Work proposed adding a new stream in Critical Leadership in Social Services and Communities to their MSW program. The stream would be course and practicum-based and is designed for people who have experience working in social or community services and who aspire to leadership roles. The new stream shares key learning objectives with the new Graduate Diploma in Critical Leadership in Social Services and Communities (approved at Senate in June 2015) as well as the existing MSW in Critical Analysis of Social Work.
REPORT TO SENATE
FROM
UNDERGRADUATE COUNCIL

i) Establishment of an Honours Bachelor of Science in Neuroscience Program (Attachment I)

At its meetings of December 9, 2014 and September 15, 2015, the Undergraduate Council approved, for recommendation to Senate, a proposal to establish an Honours Bachelor of Science in Neuroscience program. The program is geared towards undergraduate students who are interested in pursuing careers in neuroscience research or other fields built upon a strong interdisciplinary science foundation. The new Neuroscience program will be administered jointly by the Department of Biology and the Department of Psychology, Neuroscience and Behaviour. The proposed program will enhance the University's currently identified institutional program strengths in Science and Discovery, Health and Society, and Medical Education and Research, as set forth in McMaster's Strategic Mandate Agreement.

The Undergraduate Council now recommends,

that Senate approve the establishment of the Bachelor of Science in Neuroscience program, for inclusion in the 2016-2017 Undergraduate Calendar, as outlined in Attachment I.

FOR INFORMATION

ii) School of Nursing – Replacement of Supplementary Application Tool with CASPer

On July 27, 2015, the Undergraduate Council Executive Committee, acting on behalf of the Undergraduate Council, approved by e-mail, a proposal from the School of Nursing to replace their existing supplementary application tool with CASPer, beginning with the admission cycle for students entering the program in September 2016. CASPer is a screening tool used to assess the applicant's personal characteristics and has been used by the School of Medicine since 2011-2012. Undergraduate Council received the report for information at its meeting of September 15, 2015.

Documents detailing items for information are available for review on the Undergraduate Council Meeting Materials Page http://www.mcmaster.ca/univsec/agendas/agendaUGC.cfm

Senate
For Approval/Information
November 11, 2015
NEW PROGRAM PROPOSAL FOR Honours Bachelor of Science in Neuroscience  
Date: Sept. 2, 2015
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Honours B.Sc. Neuroscience Program Proposal
PROGRAM

1.1 PROGRAM DESCRIPTION

The Honours B.Sc. in Neuroscience is a 2nd-year entry program geared towards undergraduate students who are interested in pursuing careers in neuroscience research or other fields built upon a strong interdisciplinary science foundation. The program will be administered jointly by the Department of Biology and the Department of Psychology, Neuroscience & Behaviour (PNB). It will initially accept 20 students per year, with the potential for growth up to 40 students per year, provided that we have the resources in hand to expand.

The societal need for highly trained neuroscience researchers is demonstrated by several factors, among others the enormous toll that continues to be exacted on Canadian society by a vast array of neurological disorders, ranging from neurodevelopmental disorders such as autism to acute-onset disorders such as traumatic brain injury and stroke, to progressive disorders such as multiple sclerosis to disorders of aging such as Parkinson's and Alzheimer's diseases. The financial cost alone of such disorders is staggering, and the cost to the quality of life of individuals with these disorders and to their families is incalculable. Clearly, to discover the causes of neurological disorders, and to develop effective preventive measures and treatments, a large and sustained effort must be made to train future neuroscientists who will investigate basic and clinical neurological function, and who will become neuroscience educators in their own right.

The proposed Honours B.Sc. Neuroscience program will enhance the university's currently identified institutional program strengths in Science and Discovery, Health and Society, and Medical Education and Research, as set forth in McMaster's Strategic Mandate Agreement. The program will facilitate growth in the identified growth areas of Science and Engineering and Health Sciences and the broad determinants of health. The inter- and multidisciplinary nature of the proposed Honours B.Sc. Neuroscience program is also very much in keeping with the President's Forward with Integrity letter, which identifies interdisciplinarity as a key priority in undergraduate education.

The crucial need of future neuroscientists – and indeed of biologists generally – to acquire strong foundational skills across scientific disciplines is emphasized in the National Research Council's BIO2010 report¹, which conveys the importance of broadly educating future scientists with foundational knowledge from various scientific disciplines, to enable them to apply this knowledge in the effective pursuit of cutting-edge research. Neuroscience in particular is an inherently interdisciplinary field. Comprising all research related to neurons and nervous systems, neuroscience spans a vast array of topics, from the biophysical and electrochemical properties of nerve cells to the developmental biology of neural circuit formation to the information processing calculations carried out by the brain. To be able to comprehend past and current developments in neuroscience, and to contribute to future developments, students require a broad foundational skill set in Biology, Chemistry, Computer Science, Mathematics, and Physics, coupled with a strong introduction to the core areas of molecular, cellular, and systems neuroscience. The proposed program offers just such a curriculum.

Currently, McMaster students who are interested in pursuing Neuroscience careers are often unaware of the need to pursue a multidisciplinary science education, and even if they are aware of this, no ideal choice of study is available to them. Some students have attempted to cobble together a multidisciplinary program of study via a joint Biology and Psychology double-major. However, the selection of courses provided by that double-major, while rigorous in each discipline, falls far short of an ideal neuroscience education. Some students have gone so far as to pursue a fifth year of study in order to acquire a stronger

---
multidisciplinary foundation. Even this choice is inadequate, however, because crucial neuroscience courses are not presently available (e.g., the proposed NEUROSCI 3E03 and NEUROSCI 4S03). The proposed Honours B.Sc. in Neuroscience program will fully rectify this situation. The proposed curriculum is designed to provide both the rigorous multidisciplinary science foundation and the requisite specialty knowledge needed to produce excellently prepared neuroscience graduates.

There is a considerable unmet need for highly trained neuroscientists to fill a variety of career positions, and a wide choice of careers will therefore be open to graduates from the Honours B.Sc. Neuroscience program. Graduates will be ideally suited to pursue careers as academic research neuroscientists, science teachers and communicators of science, or as researchers in neuroscience-related industry and in other interdisciplinary biology-related fields. Possible career choices will include those in medicine, bioengineering, biotechnology, the emerging neurotech industry, or in clinical lab work, kinesiology, occupational therapy, or in science journalism or science policy.

1.2 PROPOSAL PREPARATION AND CONSULTATION PROCESS

The proposed Honours B.Sc. program represents the joint effort of faculty from PNB, Biology and Medical Physics and Radiation Sciences. The process initially began as a discussion of a neuroscience specialization within PNB, for which a curriculum was developed by the PNB Undergraduate Curriculum Committee during the 2012-2013 academic year and approved by both the PNB and Biology departments. During the course of these deliberations, discussion leaders of the PNB department suggested that students interested in neuroscience careers would benefit from a rigorous foundational interdisciplinary and biologically-based curriculum that would represent a significant departure from the honours PNB curriculum, so that a more appropriate route might be a separate Honours B.Sc. Neuroscience program. Feedback from the Associate and Assistant Dean of Science (Nov., 2013) reinforced this viewpoint, as they pointed out that the proposed specialization departed by more than 30% from the honours PNB curriculum. The curriculum was then reworked into an honours B.Sc. proposal, with a view towards developing a rigorous and flexible program for students. The current proposal represents the culmination of a productive collaboration among faculty within PNB, Biology, and Medical Physics and Radiation Sciences, as well as informal consultation with PNB and Biology undergraduates who tutored in the course Neuroanatomy and Neurophysiology (PNB 2XB3). Among many faculty involved in these discussions at one point or another have been the Chairs of Biology and PNB, the Associate Chairs (Undergraduate) of Biology, PNB, and Medical Physics and Radiation Sciences, and the director of the Graduate Neuroscience (MINDS) program. There is broad consensus among the faculty who have drafted this proposal that the program will appeal widely to research-oriented students within the Faculty of Science and will prepare students to excel in neuroscience research and related careers.

1.3 CONSISTENCY WITH MCMASTER’S MISSION AND ACADEMIC PLAN

The proposed Honours B.Sc. program will enhance the university's currently identified institutional program strengths in Science and Discovery, Health and Society, and Medical Education and Research, as set forth in McMaster's Strategic Mandate Agreement. By training future neuroscientists, the program will facilitate growth in the identified growth area of Science and Engineering. Research in neuroscience is vast and includes biomedical research related to neurological disorders, among many other areas. Therefore, the program will also help to address the identified growth area of Health Sciences and the broad determinants of health. In addition, the proposed program is closely aligned with two of the four priorities put forth in the President's Forward with Integrity (FWI) letter: 1) The Student Experience and 2) Research.

With respect to the student experience, the FWI letter identifies experiential learning and interdisciplinarity as two key priorities. The proposed program will provide experiential learning in the
form of the proposed laboratory course (NEUROSCI 3E03), in which students will obtain hand-on experiences in recording electrical activity from neurons, among other topics, and the honours thesis course (NEUROSCI 4L09/12), in which students will participate as junior investigators in ongoing neuroscience research projects, experiencing the neuroscience research endevour first-hand. The proposed program fits hand in glove with the priority of interdisciplinarity. Indeed, it is difficult to imagine a field of science that is more interdisciplinary than neuroscience. Both the curriculum, which draws broadly on courses from many disciplines, and the administration of the program, to be carried out jointly by two departments, reflect the teamwork and cooperative spirit that will be essential for the success of the program. The required and course-list courses are drawn from multiple departments and concentrations, including Biology, Biochemistry and Biomedical Sciences, Biophysics, Chemical Biology, Computer Science, Kinesiology, Mathematics and Statistics, Medical Physics, Physics, PNB, and others. The program will foster ties among departments, and it will produce graduates who are well-positioned to pursue successful careers in interdisciplinary fields.

With respect to research, the FWI letter discusses the importance of undergraduate research experiences and of "multidisciplinary approaches to research subjects." The proposed program will provide students with training in neuroscience research methodologies, via the lab course and honours thesis opportunities, that facilitate high-quality undergraduate research training at McMaster in the multidisciplinary field of Neuroscience. Finally, we note that the FWI letter, under both the Student Experience and the Research categories, discusses the desirability of self-directed learning. The proposed program provides self-directed learning opportunities in the neuroscience laboratory course (NEUROSCI 3E03), the neuroscience seminar course (NEUROSCI 4S03), and the honours thesis experience (NEUROSCI 4L09/12), among others.

1.4 PROGRAM LEARNING OUTCOMES
The following are the Neuroscience program’s key Learning Outcomes:

1) Students will acquire an understanding of fundamental concepts in biology, chemistry, and physics that are foundational to neuroscience, and will develop critical knowledge of three major areas of neuroscience: cellular/molecular, systems/circuits, and behavioural/cognitive neuroscience.

2) Students will be introduced, practically and conceptually, to modern tools and methods for attacking neuroscience problems.

3) Students will apply their knowledge to critically evaluating the neuroscience literature, analyzing and developing scientific hypotheses and arguments, forming considered scientific judgments, and developing creative approaches to tackling important open questions in neuroscience.

4) Students will develop skills in communicating scientific data and concepts, both orally and in writing.

5) Students will become aware of the limits of their own understanding, the limits of modern-day neuroscience understanding, and the uncertainty inherent in the interpretation of scientific data.

6) Students will acquire the scientific knowledge, technical competence, teamwork experience, and critical thinking skills needed to succeed in graduate studies in neuroscience or to obtain neuroscience-related employment.

1.5 CONSISTENCY WITH DEGREE LEVEL EXPECTATIONS
Depth and Breadth of Knowledge
This UDLE is satisfied by program learning outcome (1). Students will acquire an understanding of fundamental concepts in biology, chemistry, and physics that are foundational to neuroscience, and will develop critical knowledge of three major areas of neuroscience: cellular/molecular,
systems/circuits, and behavioural/cognitive neuroscience. Program courses of particular relevance to this learning outcome include those that provide breadth of foundational knowledge – BIOLOGY 1A03, 1M03, 2B03, 2A03, 2C03, 3P03, 4F06, BIOCHEM 2EE3, CHEM 1A03, 1A3, 2O3, 2B3, PHYSICS 1B03, PSYCH 1XX3 – and those that provide depth of neuroscience knowledge: PNB 2XB3, PSYCH 3SN3, NEUROSCI 3E03, NEUROSCI 4S03, NEUROSCI 4L09/4L12. Many additional courses are available to the students to enhance the breadth of their foundational scientific knowledge (see course list 1 in Appendix B) and the depth of their neuroscience knowledge (see course lists 2, 3, and 4 in Appendix B).

With respect to the development of critical knowledge of the core areas of neuroscience, in PNB 2XB3, students are introduced to molecular neuroscience (neurotransmitter molecules, ionic diffusion, Nernst and Goldman-Hodgkin-Katz equations, receptor and sensor proteins), cellular neuroscience (pyramidal and stellate neurons, primary afferent sensory neurons, retinal photoreceptors, horizontal cells, bipolar cells, and ganglion cells, action potential conduction, synaptic specializations and synaptic transmission, enzymatic second-messenger cascades) and systems neuroscience (functional neuroanatomy and sensory transduction in the somatosensory, auditory, vestibular, and visual systems, and motor system anatomy and function). The interdisciplinary nature of neuroscience is revealed and explored, as biochemistry, physics, and mathematics enter squarely into the course with the discussion of ionic equilibrium potentials, membrane resistance, capacitance, and electric potential, dendritic and axonal cable properties (including length and time constant formulae), the physical properties of sensory stimuli, the optical properties of the eye (including Snell's law of refraction), and the physics and biochemistry of mechanistic, acoustic and photo-transduction. The Cell Physiology course (BIOLOGY 3P03) delves further into concepts of cellular and molecular neuroscience, within the broader theme of cell physiology. The course explores in detail the concepts of ionic equilibrium, membrane potential, and action potential. It further explores particular high-resolution neuroscience techniques, including voltage-clamp and patch clamp. In an associated tutorial, students actively engage in finding solutions to neuroscience/physiology problems. The Neural Circuits course (PSYCH 3SN3) delves deeply into cellular and systems neuroscience, focusing on particular neural systems and engaging students in critical thinking exercises in which they evaluate neuroscientific hypotheses and generate their own ideas about how to test them. Students will obtain further in-depth exposure to molecular, cellular, and systems neuroscience, and the evaluation of experimental hypotheses in these areas, via their extensive readings of the research literature in all three fields in the Neuroscience Seminar course, NEUROSCI 4S03.

Knowledge of Methodologies
This UDLE is satisfied by program learning outcome (2). Students will be introduced, practically and conceptually, to modern tools and methods for attacking neuroscience problems. Program courses of particular relevance to this learning outcome are courses in quantitative methodologies – COMP SCI 1MD3, MATH 1A03/1LS3, 1AA3/1LT3, 1BO3/STATS 1L03, MED PHYS 2C03, PNB 3XE3 – and courses that explore the use of these and other methodologies: BIOCHEM 2EE3, BIOLOGY 2A03, BIOLOGY 2B03, BIOLOGY 3P03, PNB 2XB3, PSYCH 3SN3, CHEM 2O3, CHEM 2OB3, NEUROSCI 3E03, NEUROSCI 4S03, NEUROSCI 4L09/4L12. The course lists (Appendix B) provide students further exposure to the wide range of methodologies employed in neuroscience research.

In PNB 2XB3, students learn conceptually about a variety of neuroscience methods, including neurophysiological methods (extracellular recording, intracellular recording, voltage clamp, and patch clamp), optical stimulation methods (channelrhodopsin and halorhodopsin), and anatomical methods (Nissl stain). In BIOLOGY 3P03, students learn in further detail about several of these methods, including voltage clamp and patch clamp, and they engage in problem-solving activities associated with neuroscience and physiology concepts. In PSYCH 3SN3, students further delve into these and other methods, including anatomical methods (tracer studies, fluorescent protein
expression, light and electron microscopy, super-resolution microscopy, immuno-localization of proteins) and physiological methods (optogenetic stimulation and sensing, photo-uncaging, intrinsic signal optical imaging). In NEUROSCI 4S03, students will be exposed to a wide variety of neuroscience methods from their readings and discussions of the neuroscience research literature. In several courses, neuroscience students gain hands-on laboratory experience. Courses with laboratories include BIOLOGY 1A03, BIOLOGY 2A03, CHEM 2A03, CHEM 2B03, and NEUROSCI 3E03. In NEUROSCI 3E03, students obtain hand-on practical experience with neurophysiological and neuroanatomical tools and methods, including brightfield and fluorescence microscopy, neuronal visualization via staining, and invertebrate neurophysiological recording. Students who complete a thesis (NEUROSCI 4L09 or 4L12) will obtain further hands-on research experience.

Application of Knowledge
This UDLE is satisfied by program learning outcome (3). Students will apply their knowledge to critically evaluating the neuroscience literature, analyzing and developing scientific hypotheses and arguments, forming considered scientific judgments, and developing creative approaches to tackling important open questions in neuroscience. Program courses that focus on this learning outcome include: PSYCH 3S3N3, NEUROSCI 4S03, NEUROSCI 4L09/4L12.

In all of these courses, students will read and critically evaluate peer-reviewed neuroscience research papers. In PSYCH 3S3N3, students learn to critically evaluate and creatively think about neuroscientific approaches to research problems, evaluate the plausibility of a series of alternative hypotheses that provide potential explanations for neuroscientific phenomena, and propose experiments to distinguish among hypotheses. In NEUROSCI 4S03, students will engage at an advanced intellectual level, applying their knowledge of molecular, cellular, and systems neuroscience to the critical reading of the neuroscience literature in all three areas, and will critique the conclusions, data analyses, and hypotheses proposed in published studies. In the thesis course (NEUROSCI 4L09 or 4L12), students will evaluate the neuroscience literature, develop hypotheses relevant to their own research projects, and statistically analyze the data from their own experiments. The written thesis will include a focused literature review that places the student's research in the context of the broader field of study to which it pertains, a statement of the research question investigated by the student, a detailed description of the neuroscience methods used by the student to investigate the research question, a report of the results, presented both graphically and with inferential statistical data analysis, and a discussion section in which the student draws well-considered conclusions regarding the topic of study.

Communication Skills
This UDLE is satisfied by program learning outcome (4). Students will develop skills in communicating scientific data and concepts, both orally and in writing. Program courses of particular relevance to this learning outcome are: PSYCH 3S3N3, NEUROSCI 4S03, NEUROSCI 4L09/12, BIOLOGY 4F06, and PNB 4SC6.

The development of science communication skills will begin even before students are admitted to the program, with the first-year required course, BIOLOGY 1A03, in which students create a formal lab report to communicate their findings from the laboratory component of the course. The development of written and oral communication skills is further emphasized throughout the curriculum. Science communication is a major component in PSYCH 3SNS. Students submit their own written explanations of figures from published neuroscience papers, and they present orally on the background, methods, results and conclusions from published scientific studies. In NEUROSCI 4S03, students will similarly create both written and oral presentations of the neuroscience literature in molecular, cellular, and systems neuroscience. In NEUROSCI 4L09/4L12, students will produce a written thesis to communicate the results of their own research projects in the context of the relevant neuroscience literature. As explained above, the
thesis will include a focused literature review that places the student's research in the context of the broader field of study to which it pertains, a statement of the research question investigated by the student, a detailed description of the neuroscience methods used by the student to investigate the research question, a report of the results, presented both graphically and with inferential statistical data analysis, and a discussion section in which the student draws well-considered conclusions regarding the topic of study. Neuroscience thesis students will present their work at an end-of-year poster session to which all neuroscience thesis supervisors and students will be invited. Students who take BIOLOGY 4F06 are similarly required to produce a written summary of their work akin to a thesis report, and also to present their work, either as a poster or a slide presentation, at the end-of-semester Biology undergraduate symposium, attended by both students and faculty. Students who take PNB 4SC6 (Science Communications) will focus on producing accurate, articulate, and compelling written communications of scientific studies for a lay audience. Students will write brief news reports, longer news articles, and articles appropriate for popular science magazines such as Scientific American, among other assignments. This course covers news from various areas of science. Neuroscience students taking PNB 4SC6 will be encouraged, but not required, to produce at least one neuroscience-specific news report or article.

Awareness of Limits of Knowledge
This UDLE is satisfied by program learning outcome (5). Students will become aware of the limits of their own understanding, the limits of modern-day neuroscience understanding, and the uncertainty inherent in the interpretation of scientific data. Program courses of particular relevance to this learning outcome are: BIOLOGY 1A03, 1M03, 2B03, 2A03, 2C03, 3P03, 4F06, BIOCHEM 2E03, CHEM 1A03, 1AA3, 2OA3, 2OB3, PHYSICS 1B03, PNB 2XB3, PNB 3XE3, PSYCH 3SN3, PNB 4SC6, NEUROSCI 4S03, NEUROSCI 4L09/4L12.

In PNB 2XB3, students are exposed to the limits of neuroscience knowledge, in particular the gap in our modern neuroscience understanding of how higher brain functions, such as cognition and consciousness, arise from the activity of neural circuits, as well as lack of understanding of the causes many neurological conditions. In BIOLOGY 3P03, the resolution and limits of neurophysiological methodologies and knowledge are further explored. In PSYCH 3SN3, students are made aware of the limits in understanding of current neuroscience explanatory models in systems and circuits neuroscience, of limitations in the resolution and precision of neuroscience experimental techniques, including light and electron microscopy techniques, extracellular neurophysiological techniques, whole-cell patch clamp recording techniques, voltage-sensitive dye imaging techniques, and many others. In NEUROSCI 4S03, students will face the limits of neuroscience understanding as expressed by the authors of published research studies investigating a wide variety of topics in molecular, cellular, and systems neuroscience. In PNB 3XE3, students will study inferential statistics, and will learn that all statistical conclusions are probabilistic inferences that carry uncertainty. Students who complete a thesis (NEUROSCI 4L09/4L12) will apply statistical analyses to their own data in their thesis work, and will thereby face the need to recognize the uncertainty inherent in their conclusions. Students who take PNB 4SC6 (Science Communications) will learn the importance of communicating not only scientific discoveries but the uncertainties and caveats associated with them, and the further research questions raised by every new discovery.

Autonomy and Professional Capacity
This UDLE is satisfied by program learning outcome (6). Students will acquire the scientific knowledge, technical competence, teamwork experience, and critical thinking skills needed to succeed in graduate studies in neuroscience or to obtain neuroscience-related employment, such as for instance in clinical or biotech laboratories. Many courses within the program are relevant to this outcome.

With respect to scientific knowledge, of particular relevance are the neuroscience-specific
courses, PNB 2XB3, PSYCH 3SN3, NEUROSCI 3E03, NEUROSCI 4S03, NEUROSCI 4L09/4L12. With respect to technical competence, of particular relevance are the skills-based courses, such as MED PHYS 2C03, PNB 3XE3, NEUROSCI 3E03, and NEUROSCI 4L09/4L12, as well as the earlier foundational courses in mathematics and computer programming, and the courses with laboratory components: BIOLOGY 1A03, BIOLOGY 2A03, CHEM 2O3, CHEM 2OB3, and NEUROSCI 3E03. With respect to teamwork experience, important courses are PNB 2XB3, in which students have the opportunity for collaborations on assignments, PSYCH 3SN3, in which students are encouraged to work in study group teams to discuss assigned research papers, NEUROSCI 3E03, which will involve group work around laboratory projects, NEUROSCI 4S03, in which teams of students will prepare and produce oral presentations on research articles, and NEUROSCI 4L09/4L12, in which students will often be working in teams that include other undergraduates and also graduate students and/or postdoctoral researchers, under the supervision of a faculty member. With respect to critical thinking skills that will serve lifelong learning, of particular relevance are PNB 3XE3, which teaches inferential statistical analysis, BIOLOGY 3P03, which engages students in problem solving around topics in neurophysiology, PSYCH 3SN3, which involves critical evaluation of the literature, hypothesis generation, and the proposal of experiments to test hypotheses, NEUROSCI 4S03, which involves critical reading and evaluation of the research literature, and the thesis course, NEUROSCI 4L09/4L12. Finally, students will have learned, by the time of their graduation, the ability to manage their own learning and to select an appropriate program for further study. They will have learned this in part as a result of the structure of the Neuroscience program, which requires students to choose several from among a large list of course list courses (see Appendix B), a practice the encourages students to take responsibility for designing their own program of study.

1.6 DEMAND FOR PROGRAM

I. Evidence of Societal/Labour Market Need

The societal need for highly trained neuroscience researchers is demonstrated by several factors. First, an enormous toll continues to be exacted on Canadian society by a vast array of neurological disorders, ranging from neurodevelopmental disorders such as autism to acute-onset disorders such as traumatic brain injury and stroke, to progressive disorders such as multiple sclerosis to disorders of aging such as Parkinson's and Alzheimer's diseases. The financial cost alone of such disorders is staggering. In its 2007 report entitled "The Burden of Neurological Diseases, Disorders and Injuries in Canada", the Canadian Institute for Health Information (Ottawa) reported the following statistics regarding just 11 neurological conditions considered in the report:

"The total cost of the 11 neurological conditions highlighted in this report was estimated to be $8.8 billion, representing 6.7% of the total attributable cost of illness in Canada in 2000–2001.

The 11 highlighted neurological conditions accounted for 2.4% of the total direct cost of illness in Canada in 2000–2001.

Nine of 11 highlighted neurological conditions (for which data were available) accounted for 8.3% of the total indirect cost of illness in Canada in 2000–2001.

Six of 11 highlighted neurological conditions (for which data were available) accounted for 10.6% of the total disability-adjusted life years in Canada in 2000–2001.

Just over 9% of acute care hospitalizations and 19% of patient days in acute care hospitals in Canada in
2004–2005 were for patients with one of the 11 highlighted neurological conditions as a primary or secondary diagnosis.

20% of patients receiving inpatient rehabilitation in 2005–2006 had one of the following conditions: head injury, multiple sclerosis, Parkinson's disease, spinal injury or stroke.

50% of complex continuing care (CCC) stays and 65.1% of CCC patient days in Ontario in 2005–2006 were for patients with Alzheimer's disease, ALS, cerebral palsy, epilepsy, head injury, multiple sclerosis, Parkinson's disease or stroke.

Clearly, to fight such financial and quality-of-life costs, a large and sustained effort must be made to train future neuroscientists who will investigate basic and clinical neurological function, and who will become neuroscience educators in their own right. We note that the above-cited report considered only 11 neurological disorders. This is a small fraction of the total number of neurological disorders, and therefore the cost to society is in fact much greater than listed above. As one indication, the National Institute of Neurological Disorders and Stroke (NINDS) of the U.S. National Institutes of Health lists over 400 neurological disorders (www.ninds.nih.gov/disorders/disorder_index.htm).

From a basic science, curiosity-driven research perspective, the human brain - often called our three-pound universe within - is perhaps the most remarkable achievements of evolution of life on earth. Somehow, the brain develops naturally – following genetic instructions and sculpted by environmental influences – to become an organ that provides us with our thoughts, memories, emotions, sense of self and consciousness. How these features of our humanity emerge from the electrical activity of an estimated hundred billion interacting neurons is among the most profound of scientific mysteries. A race is on among neuroscientists the world over to elucidate this mystery by investigating the processes that underlie the development and functioning of the brain. The proposed program will help to propel Canadian science into a more advantageous position to accomplish this goal and compete with our international friends in this scientific race towards discovery.

An indicator of the global labour market demand for neuroscience-trained individuals is the large attendance at the annual meetings of the international Society for Neuroscience. The meeting currently attracts approximately 30,000 attendees annually. Of these, approximately 25,000 are neuroscientists or neuroscientists-in-training (graduate students or postdoctoral researchers), and 5,000 are in the non-scientific sector, including in industries such as scientific instrument manufacturing and science publishing. This is evidence of the large labor market capacity for neuroscience-trained individuals, both within and outside academia. Also of interest in this regard is the large growth in meeting attendance that has occurred decade-to-decade. For instance, meeting attendance has more than tripled since 1985, and has increased by almost 10,000 people since 1995. For meeting attendance statistics, see http://www.sfn.org/Annual-Meeting/Past-and-Future-Annual-Meetings/Annual-Meeting-Attendance-Statistics/AM-Attendance-Totals-All-Years.

An indicator of the surge in interest in neuroscience within Ontario, and the labour market opportunities for neuroscience-trained individuals, is the recent (2010) founding of the Ontario Brain Institute (OBI). The OBI provides the following summary on its webpage (http://www.braininstitute.ca/about-us):

The Ontario Brain Institute is a provincially-funded, not-for-profit research centre seeking to maximize the impact of neuroscience and establish Ontario as a world leader in brain discovery, commercialization and care. Convergent partnerships are created between researchers, clinicians, industry, patients, and their advocates to foster discovery and deliver innovative products and services that improve the lives of those living with brain disorders.

An indicator of labour market need for neuroscientists in Ontario is provided by the Ontario Ministry of
Training, Colleges and Universities. The listing for "Biologists and related scientists" indicates an Employment Prospect rating of average for 2013-2017. The data also show that employment growth in this field from 2001 to 2011 exceeded that in Professional Occupations in Natural and Applied Sciences and also exceeded that in All Occupations. Source: https://www.app.tcu.gov.on.ca/eng/labourmarket/oj9/.

We note that a rather wide choice of careers will be open to graduates from the Honours B.Sc. Neuroscience program. Graduates will be ideally suited to pursue careers as academic research neuroscientists, science teachers and communicators of science, or as researchers in neuroscience-related industry and in other interdisciplinary biology-related fields. Possible career choices will include those in medicine, bioengineering, biotechnology, the emerging neurotech industry, or in clinical lab work, kinesiology, occupational therapy, or physiotherapy, or in science journalism or science policy. Graduates' critical thinking and quantitative skills will make them attractive to jobs in the financial sector as well, such as data analyst positions.

II. Evidence of Student Demand

A common experience among faculty who teach undergraduate neuroscience courses at McMaster has been a consistent expression of interest from undergraduate students for additional neuroscience opportunities. It is our clear impression that many students enter McMaster from high school already excited about neuroscience. In conversations with students over the years, we have received overwhelming enthusiasm at the mere mention of a possible Honours B.Sc. Neuroscience program. Although we have not taken formal surveys, our clear impression is that many students who currently double-major in Biology and Psychology would prefer to take a neuroscience degree, but the interest in an Honours B.Sc. Neuroscience major clearly extends well beyond PNB and Biology majors into Life Science majors and others.

During the early stages of the development of the proposed program, Dr. Goldreich consulted with undergraduate student tutors who volunteer to help in his course, Neuroanatomy and Neurophysiology (PNB 2XB3). Those students were overwhelmingly enthusiastic about the program and several expressed regret that the program would arrive too late for them to enter it. Feedback from those students informed several aspects of the design of the proposed program, including the cohort-building design feature, in which Neuroscience majors taking PNB 2XB3 will have a separate tutorial section.

As a further indication of strong interest among McMaster undergraduates in neuroscience, we note that McMaster undergraduates in Biology and PNB – entirely on their own initiative – founded and now run an annual neuroscience conference open to undergraduate students from McMaster and other universities, the NeuroXchange conference. Since its inception in 2011, this conference has been well-attended and met with considerable enthusiasm among the students. The 2015 NeuroXchange conference had 91 registered participants, about half of them McMaster undergraduates. The conference involves poster presentation by students who have completed theses doing neuroscience-related work, a keynote speaker (typically, an invited faculty member from a Canadian university), and a graduate careers panel in which graduate students and faculty discuss careers in neuroscience with the undergraduate attendees. Indeed, the Mission statement of the NeuroXchange conference, displayed on the conference website created by the undergraduates who direct the conference (http://biopsych.wix.com/neuroxchange#!/about), clearly demonstrates the interest among students in pursuing neuroscience-related careers:

Organized by the McMaster Biology and Psychology Society, the NeuroXchange Conference (NXC) is a Canada-wide undergraduate research conference that brings together undergraduate students to showcase their research in the field of neuroscience. The conference provides the opportunity for undergraduate students to explore their interest in neuroscience, and encourages their ongoing growth in the field as they continue into graduate or professional studies.

Apart from our undergraduates, the growing interest in neuroscience research among faculty on campus is
reflected in the initiation in 2007 of McMaster's neuroscience graduation program, McMaster Innovative Neuroscience Discovery and Study (MINDS), and in the initiation in 2014 by McMaster's multi-disciplinary Origins Institute of a new research theme, Origins of Consciousness, to accompany its existing themes relating to the biggest unsolved questions in science. Our program proposal will follow up these exciting graduate-level research initiatives with a long-overdue investment in undergraduate neuroscience education at McMaster.

III. Justifiable Duplication

Reflecting the strong demand for neuroscience education in Canada, an Honours Neuroscience B.Sc. degree is offered by several Ontario universities, including Brock, Carleton, Guelph, Laurentian, U. Toronto, and U. Toronto Scarborough (several other universities offer neuroscience specializations, but not a B.Sc.). McMaster has been woefully behind the curve in this regard, and our proposed program will remedy this situation. At the same time, the program that we are proposing is not a duplicate of any other, but rather has unique properties that make it exceptional within Ontario. Specifically, our proposed program differs from most others in three respects:

1) The proposed program offers a stronger multi-disciplinary foundational science base than do most other programs in Ontario. The rigorous multi-disciplinary nature of the curriculum is evident from a look at the curriculum spreadsheet (Appendix B). In total (including level 1 courses required for entry to the program in level 2), students are required to complete 21 units of Biology/Biochemistry, 12 units of Chemistry, 6 units of Physics/Med Physics, and 12 units of Math/Comp Sci. Many students will complete additional courses in one or more of these fields as they choose from among the course list options (Appendix B). This rigorous multi-disciplinary science foundation provided by the program reflects the inherently multi- and inter-disciplinary nature of neuroscience and conforms with the focus on interdisciplinary education in the President's FWI letter as well as with the National Research Council's BIO2010 report, which emphasizes the importance of broadly educating future biological scientists with foundational knowledge from chemistry, physics, math and computer science in order to enable cutting-edge research.

The difference between our proposed program and others in Ontario is particularly evident in the category of math and computer science courses. The table below shows the number of semester-long required basic science courses for various Honours B.Sc. Neuroscience curricula in Ontario (neuroscience-specific courses are not listed). Parentheses indicate options owing to flexible curriculum requirements. Our proposed curriculum is listed in the top row.

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<th>Chemistry</th>
<th>Physics</th>
<th>Math/Comp Sci</th>
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<td>2</td>
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<tr>
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<tr>
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<td>Guelph</td>
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<td>Laurentian</td>
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<td>U Toronto Scarborough</td>
<td>5 (or more)</td>
<td>2</td>
<td>0</td>
<td>0</td>
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2calendar.carleton.ca/undergrad/undergradprograms/biology/#Neuroscience_BSc_Combined_Honours
3www.uoguelph.ca/registrar/calendars/undergraduate/current/pdf/files/c10bsc.pdf
4Specialization in Behavioural Neuroscience: http://laurentian.ca/program/behavioural-neuroscience
5Neuroscience major (science program): http://hmb.utoronto.ca/index.php?q=node/127
6www.utsc.utoronto.ca/~registrar/calendars/calendar/Neuroscience.html

We would like to acknowledge that all of these programs have strengths. The table is meant only to...
illustrate one way in which our program differs from most others.

2) The proposed program is structured to emphasize three major neuroscience subfields. This is evident in our course lists, which are subdivided into neuroscience categories: Cellular/Molecular neuroscience (Course list 2), Systems/Circuits neuroscience (Course list 3), and Behavioural/Cognitive neuroscience (Course list 4). By requiring students to select courses from all three of these lists, we ensure their exposure to a full gamut of neuroscience sub-fields, while still providing considerable flexibility in allowing students to configure their own curriculum. Specifically, while they are required to select from each list, students are able to select more frequently from lists that they favor most. For instance, in level 3, students are required to select 6 units from course lists 1-4, which allows them to focus on particular lists that suit their interests most. In level 4, however, students are required to take at least 3 units from each of courses lists 2, 3, and 4, ensuring broad exposure to neuroscience sub-fields. Students further control their own curriculum, as they are able to choose from among many courses on each list. Our requirement that students take at least three units from each of these fundamental neuroscience subfields is unique among Honours Neuroscience B.Sc. programs in Ontario, though other programs do offer courses in these subfields.

3) The proposed program involves a teaching laboratory (NEUROSCI 3E03) that will train students not only in neuroanatomical methods but also in single-neuron electrophysiological methods. An undergraduate teaching laboratory that includes hands-on single-cell neurophysiological methods is rare within Canadian universities. Indeed, although other Ontario Honours B.Sc. Neuroscience programs do offer laboratory courses, to our knowledge none is currently offering a laboratory course such as the proposed NEUROSCI 3E03 course.

1.7 DEGREE NOMENCLATURE
This is a science degree-program of breadth and depth. The range of foundational courses in the program recognizes and helps students prepare for the interdisciplinary nature of neuroscience; the upper-level courses engage students directly with fundamental neuroscience questions of historical and contemporary interest; and the flexibility of the course lists allows students to focus – depending on their individual interests – on any of several disciplines that bear directly on neuroscience. Therefore, Honours B.Sc. in Neuroscience is the appropriate degree nomenclature and name for this program.

ADMISSION & ENROLMENT

2.1 ADMISSION REQUIREMENTS
The proposed program is a 2nd-year entry program. In keeping with the interdisciplinary nature of neuroscience, the program admission requirements include the completion of first-year foundational courses in Biology, Chemistry, Physics, and Mathematics, as well as Foundations of Psychology, Neuroscience and Behaviour (PSYCH 1XX3).

2.2 ENROLMENT PLANNING AND ALLOCATIONS
We aim to adjust CA admission requirements annually to accept approximately 20 2nd-year students per year into the program over its first several years of operation, with the possibility of growth to 40 students per year – resources permitting. In a feasibility analysis, we have estimated that over 100 first-year students at McMaster are already taking each of the required first-year courses needed for 2nd-year entry into the program. We expect this number to increase as the program is effectively advertised to incoming first year students. Therefore, we do not anticipate difficulty recruiting 20 students per year, and indeed we expect that as the program grows in reputation, the number of applicants will far exceed the number we are able to accept into the program.
2.3 ALTERNATIVE REQUIREMENTS
N/A

STRUCTURE

3.1 ADMINISTRATIVE, GOVERNANCE AND COMMUNICATION
The program will be administered jointly by PNB and Biology. An advisory committee will monitor the progress of the program and make recommendations to the department chairs and associate chairs, undergraduate. The advisory committee will meet at least twice per academic year, and will consist of at least two faculty members from each department and two undergraduate student representatives (upper-level Neuroscience students). Academic advisors in both departments will be knowledgeable about the structure of the program and available for student consultation.

3.2 STRUCTURE AND REGULATION
Students will complete 30 units per year to satisfy the degree requirements. The program is 2nd-year entry, but the level 1 requirements that students must complete in order to gain entry in their 2nd year were carefully chosen to include foundational courses in Biology, Chemistry, Physics and Mathematics. Beginning in level 2, students take more-advanced courses in these fields as well as neuroscience-specific courses. Students also take skill-building courses that provide essential skills for a career in neuroscience research (e.g., Introduction to Programming; Electronics for Medicine & Biology; Inferential Statistics), and they gain crucial practical experience in the Neuroscience Laboratory course. The curriculum culminates with a yearlong 4th-year seminar course in which students critically evaluate current neuroscience research, together with either a yearlong thesis research experience (NEUROSCI 4L09/12) or another yearlong capstone course (Biology 4F06 or PNB 4SC6).

As can be seen in the curriculum spreadsheet and calendar copy (Appendix B), despite the rigorous schedule of required science courses, we have taken care to build in considerable flexibility that allows students to chart their own path through the program. This flexibility comes in three forms: First, students will have two elective course each year (i.e. on elective course per semester). Second, students control their own curriculum as they are able to choose from among many courses in the course lists. In level 3, students will select six units from course lists 1-4. Course list 1 provides additional foundational courses in the basic sciences; course lists 2, 3, and 4 provide a selection of courses in Cellular/Molecular Neuroscience, Systems/Circuits Neuroscience, and Behavioural/Cognitive Neuroscience. In level 4, students will select at least three additional units from each of courses lists 2, 3, and 4, ensuring broad exposure to neuroscience sub-fields. Third, in their fourth and final year, students will all take the yearlong Neuroscience Seminar course (NEUROSCI 4S03) but have flexibility in choosing their other yearlong capstone course. They may choose to apply for a research thesis (NEUROSCI 4L12 or 4L09) or to take a senior project (BIOLOGY 4F06) – both options suitable for those considering careers in neuroscience research – or instead they may take a capstone course in scientific communication (PNB...
4SC6) – particularly suitable for those considering careers as teachers or communicators of neuroscience.

3.3 PROGRAM LENGTH & PROGRESSION

The proposed program is a 2nd-year entry program. Building on a firm science foundation acquired by students in their first year of university, the program accomplishes its goal of providing an excellent neuroscience education to students via a logical progression of coursework and practical experiences (lab and thesis) in years 2, 3, and 4. The proposed new laboratory course will substantially advance students’ understanding of the material covered conceptually in courses and will advance students’ practical skills, leading to enhanced opportunities for graduate school or employment after graduation. The new level 4 Neuroscience Seminar course will challenge students to read and evaluate current research in Molecular, Cellular, and Systems Neuroscience. Students will select one other level 4 capstone course as well: either a research thesis (NEUROSCI 4L12 or 4L09), a senior project (BIOLOGY 4F06), or a capstone course in scientific communication (PNB 4SC6).

CURRICULUM AND TEACHING

4.1 PROGRAM CONTENT

Neuroscience is a broad discipline that spans many research and applied fields, the exercise of which benefits greatly from a multidisciplinary education. Our curriculum reflects the inherently multidisciplinary nature of neuroscience by providing a strong foundation in relevant Biology, Chemistry, Physics, and Math topic areas, as well as required neuroscience-specific courses. At the same time, through the use of course lists, we have built considerable flexibility into the curriculum to allow individual students to choose a path that emphasizes specialty areas of their preference. On top of the firm foundation provided by the required courses, students will select from the course lists to acquire more specific expertise in cellular/molecular, systems/circuits, and/or behavioural/cognitive neuroscience (See Appendix B for full list of required courses and course list options.)

Because neuroscience is a rapidly developing field, the content of our neuroscience courses will continue to be updated as new research discoveries are made. Whereas textbook-based courses can be slow to respond to ongoing developments in a field, our advanced neuroscience courses (e.g., PSYCH 3SN3, NEUROSCI 4S03, and NEUROSCI 4L09/12, among the required courses) are not based in textbooks but rather in original readings of the scientific literature. These courses will respond rapidly to new developments in the field. The curriculum thus aims to prepare graduates who are kept abreast of modern neuroscientific knowledge and are therefore ideally positioned to pursue careers as academic research neuroscientists, teachers and communicators of neuroscience, or researchers in neuroscience-related industry and in other interdisciplinary biology-related fields. As noted above, graduates will be well positioned to pursue careers in medicine, bioengineering, biotechnology, neurotech, or in clinical lab work, kinesiology, occupational therapy, or physiotherapy, or in science journalism or science policy. Graduates’ critical thinking and quantitative skills will make them attractive to jobs in the financial sector as well, such as data analyst positions.

4.2 PROGRAM INNOVATION

One innovative element of our curriculum is the structure of the course lists. Our Course Lists 2, 3 and 4 are organized into three categories, following the same classifications used by the Journal of Neuroscience, the flagship journal of the Society for Neuroscience: Cellular/Molecular neuroscience, Systems/Circuits neuroscience, and Behavioural/Cognitive neuroscience. Students may choose courses from one or all of these categories to design a curriculum in keeping with their own interests and that prepares them for further specialization if they choose to pursue graduate studies in neuroscience. This is
a form of self-directed learning that is built into the program structure.

The flexibility of the program is further enhanced by the choice that students will have in their fourth year of completing a research thesis (NEUROSCI 4L12 or 4L09) or a senior project (BIOLOGY 4F06) — particularly suitable for those considering careers in neuroscience research — or instead a capstone course in scientific communication (PNB 4SC6) — particularly suitable for those considering careers as teachers or communicators of neuroscience. At the same time, all students will complete the 4th year Neuroscience Seminar course (NEUROSCI 4S03), in which they will further build a sense of cohort as they read, critique, and present neuroscience research articles.

Another unique element of the curriculum is the proposed Neuroscience Laboratory course, NEUROSCI 3E03. This course will promote hands-on experience with neuroanatomical and single-cell neurophysiological methods, and will be the first of its kind at McMaster University and one of only a few such undergraduate teaching laboratories in Canada.

Also innovative will be our emphasis on providing students with cascades-of-learning opportunities, in which students in their later years can volunteer to tutor those in earlier years. This is already happening in the PNB 2XB3 course, with the participation of approximately ten 3rd-year tutors who volunteer their time each year to assist students in this 2nd-year course. The neuroscience tutor position has become a prestigious position sought after by the best-performing students in the course each year. We intend to expand this program by implementing similar volunteer tutor opportunities in PSYCH 3SN3 and NEUROSCI 3E03, and to forge relationships among graduate TAs from the MINDS program and the undergraduate Neuroscience students.

Another innovative element will be the use of the learning portfolio by students to showcase their work throughout the program. We will strongly encourage students to keep a learning portfolio to document their experiences and accomplishments, and to serve as a dynamic curriculum vitae that can be helpful for future employment opportunities, among other uses.

A final innovative component will be an end-of-school-year Neuroscience Showcase conference, in which all graduating 4th-year Neuroscience students present their 4th-year capstone coursework in poster format. All faculty supervising Neuroscience students will be expected to attend, and invitations will go out as well to all faculty who teach in the neuroscience program, to all MINDS graduate students, and to all Neuroscience program undergraduate students in their 2nd and 3rd years.

### 4.3 MODE(S) OF DELIVERY

The majority of courses will be in lecture format. This format is suitable for the foundational courses, in which students begin to achieve mastery of the core areas (molecular, cellular, and systems) of neuroscience, and begin to apply this knowledge to the analysis of problems in neuroscience and related fields.

Two other modes of delivery are the laboratory format and the seminar format. Courses with laboratories include BIOLOGY 1A03, BIOLOGY 2A03, CHEM 2O3A, CHEM 2OB3, and NEUROSCI 3E03. In the Neuroscience Laboratory course (NEUROSCI 3E03), students will gain practical hands-on experience with neuroanatomical and neurophysiological methods. Further laboratory experience will be gained by students doing honours theses (NEUROSCI 4L09 or NEUROSCI 4L12).

With respect to seminar courses, in the Neural Circuits (PSYCH 3SN3) course, students attend lectures and also participate in seminars that require them to read original research articles and to critically evaluate and communicate scientific data and concepts. These skills are honed in the Neuroscience Seminar course (NEUROSCI 4S03).
4.4 EXPERIENTIAL LEARNING

Experiential learning activities in the proposed program include the laboratory course (NEUROSCI 3E03) and the thesis course (NEUROSCI 4L12/09). We do not plan to provide external experiential opportunities such as co-op placements.

4.5 ACCESSIBILITY

The program will endeavour proactively to design courses that are accessible, inclusive, and respectful of all students. We will endeavour to engage students with learning opportunities that are appropriate to the multiple individual learning styles that we expect to see among our study body. Course instructors will endeavour always to use inclusive language and to respond promptly to any offensive or discriminatory comments or behaviours that occur in the classroom. Instructors will discuss the importance of inclusivity, respect, and tolerance with their teaching assistants. Instructors will endeavour to post their course syllabi in an accessible online format in advance of the term, to post lecture material prior to the class period, and to make lecture material available in accessible electronic or audio format whenever possible. Instructors will be encouraged and expected to make appropriate accommodations and allowances for students whose beliefs or customs prevent their attendance during certain class periods, and to ensure adequate breaks during lectures to accommodate students’ comfort and needs.

4.6 RESEARCH REQUIREMENTS (IF APPLICABLE)

Neuroscience students will have the option of applying for thesis research in their 4th year. So that students can arrange a curriculum to suit their interests and career goals, we have incorporated a great deal of flexibility into the 4th year of study. Students who choose to pursue a thesis can select either a 9-credit (NEUROSCI 4L09) or a 12-credit option (NEUROSCI 4L12). Students who choose not to pursue a thesis can instead take the senior project course (BIOLOGY 4F06), in which, like a thesis student, they work under the guidance of a faculty member. BIOLOGY 4F06 students may work within a research laboratory or they may pursue literature research, as determined in consultation with their faculty supervisor. Another option for students not wishing to pursue a thesis is the Science Communications course (PNB 4SC6).

We anticipate that students committed to research careers will take either NEUROSCI 4L12, NEUROSCI 4L09, or BIOLOGY 4F06, whereas those more interested in non-research careers, such as in science journalism, public science policy, or teaching careers, may tend to select PNB 4SC6. The flexibility of options for the 4th year serves not only the best interests of the students, but it serves to reduce any burden that might otherwise be caused on departments if a thesis experience were mandatory. Given the optional nature of the Neuroscience thesis and the large numbers of research laboratories equipped to accept students (some neuroscience labs presently accept fewer thesis students than capacity, because current student applicants are often underprepared for neuroscience thesis positions), we anticipate that the vast majority of students who have performed well in the curriculum and who wish to do a thesis will indeed be accepted into a thesis lab.

Students enrolled in a thesis course will be expected to demonstrate practical and conceptual mastery of laboratory safety, defined laboratory techniques, best practices for keeping lab notebooks, oral and written communication skills (presenting their project orally and in the thesis), and critical understanding of the research subfield in which their thesis work is conducted. Mastery of these skills will render students employable in fields such as biotech and clinical work, as well as any field that values good record-keeping and communication skills.

ASSESSMENT OF LEARNING
5.1 METHODS FOR ASSESSING STUDENTS

Within courses, student performance will be assessed using a range of tools as deemed appropriate to the learning objectives of the specific course. Methods of assessment will include weekly homework assignments, midterm tests and final exams, oral and written presentations, in-class critical-thinking exercises, practical lab evaluation, and self-assessment. Specific key assessments that will be used to judge whether students have met each of the Program Learning Outcomes are listed below (Section 5.3).

5.2 CURRICULUM MAP

The table below shows the program courses (with the exception of course-list courses) and how they satisfy each of the six program learning outcomes. Shown are the level at which each PLO is addressed, the method used to teach the PLO, and the tools used to assess student work.

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<th>Course Code</th>
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Level: I = introductory, M = intermediate, A = advanced
Method: L = lecture, R = readings, ACT = active engagement and critical thinking
Assessment: MT = midterm tests, FE = final exam, Q = quizzes, HW = homework assignments, LR = literature review, LW = lab work, ICE = in-class exercises, GP = group projects, IP = individual projects, TP = term papers, GO = group oral presentation, IO = individual oral presentation, EL = experiential learning, PA = peer assessment, HT = honours thesis.

*The typical student experience is indicated; details will vary according to the laboratory that the student joins and the specific project the student undertakes.

5.3 DEMONSTRATING STUDENT ACHIEVEMENT

Student achievement in the program will be assessed and documented in several ways.
1) Learning Portfolios: We expect students to keep up-to-date learning portfolios, in which they highlight the work that they consider their best and most meaningful. Students will be expected to contribute to their portfolios frequently throughout their tenure in the program, and to share their portfolios at the end of each academic year with the program administration. This will allow the program to assess and track student progress each year with respect to the PLOs. The program will also archive the learning portfolios of students who have graduated, thereby providing documentation of student achievement throughout the curriculum. A particularly important demonstration of student achievement will be the work that they complete in the 4-year yearlong capstone courses. This work to some extent represents the culmination of the students' experience, and we expect much of it will be included in the students learning portfolios. As explained previously, all students will take the yearlong seminar course, NEUROSCI 4S03, and in addition students will choose one from among four other capstone courses: NEUROSCI 4L09, NEUROSCI 4L12, BIOLOGY 4F06, and PNB 4S06. Each of these courses involves important written work. In the Neuroscience Seminar (NEUROSCI 4S03), students will read, critically evaluate, and present orally on original research articles in cellular/molecular, systems/circuits, and behavioural/cognitive neuroscience. Thesis students (NEUROSCI 4L09/12) will report their research results in their theses. Senior project students (BIOLOGY 4F06) will similarly produce written reports. Finally, Science Communications students (PNB 4S06) will generate several written reports throughout the course. We expect students to highlight their work in these courses within their learning portfolios, and to share their portfolios with the program administration.

2) PLO Assessment, Neuroscience Seminar course: An innovative assessment will be employed in order to judge whether students have met each of the Program Learning Outcomes by the end of their culminating year of study. This assessment method will be used in the capstone yearlong Neuroscience Seminar course (NEUROSCI 4S03) that all students will take during their 4th year of studies. The assessment – which we will call the student's PLO Assessment – consists of the following six questions regarding the student's performance in the seminar course:

Assessing student achievement on PLO 1: Did the student show understanding of fundamental concepts in Biology, Chemistry, and Physics that are foundational to neuroscience, and show critical knowledge of the core areas (molecular, cellular, and systems) of neuroscience?

Assessing student achievement on PLO 2: Did the student show understanding of modern tools and methods for attacking neuroscience problems?

Assessing student achievement on PLO 3: Did the student critically evaluate the neuroscience literature, analyzing and developing scientific hypotheses and arguments, forming considered scientific judgments, and developing creative approaches to tackling important open questions in neuroscience?

Assessing student achievement on PLO 4: Did the student skillfully communicate scientific data and concepts, both orally and in writing?

Assessing student achievement on PLO 5: Did the student demonstrate awareness of the limits of his/her own understanding, the limits of modern-day neuroscience understanding, and the uncertainty inherent in the interpretation of scientific data?

Assessing student achievement on PLO 6: Did the student demonstrate the scientific knowledge, technical competence, teamwork experience, and critical thinking skills needed to succeed in graduate studies in neuroscience or to obtain neuroscience-related employment?

Importantly, both the course instructor and the student will (separately) answer each of these questions in both yes/no format and, following the yes/no answer, in written format to elaborate (not exceeding 250 words per written answer). They will then be required to meet to compare and discuss their answers, and
will have the chance to modify their answers, if either feels this is appropriate. 10% of the student’s course grade will be based on the instructor’s answers to these six questions.

The program will archive the Neuroscience Seminar instructor’s PLO assessment sheet (the answers to the six questions listed above) for each student, and will create spreadsheet summaries of the students’ scores for each year in program, for each of the six questions. These sheets will be used to track the success of the program in meeting its PLOs, and to detect any changes that may occur from year-to-year as the program matures. In addition, if students’ scores are notably weaker to any one or more questions, those weaknesses will be detected, discussed by the program leadership, and appropriate remedies implemented to improve student learning in subsequent years.

3) Neuroscience Showcase Conference Performance: We will hold an end-of-school-year Neuroscience Showcase conference, in which all graduating 4th-year Neuroscience students present their 4th-year capstone coursework (other than their work in the Neuroscience Seminar course) in poster format (i.e., the presented work will be either the student’s thesis work, senior project work, or work in the communications course). All faculty supervising Neuroscience students will be expected to attend, and invitations will go out as well to all faculty who teach in the neuroscience program, to all MINDS graduate students, and to all Neuroscience program undergraduate students in their 2nd and 3rd years. Two professors will judge the poster presentation of each student. Based on the student’s poster presentation, these two professors will complete the same six questions (the PLO Assessment) already completed by the instructor of the Neuroscience Seminar course. In order to demonstrate and record student achievement, we will keep records of all posters presented (students will submit their posters in advance of the conference, in PDF format), and of the students’ conference PLO Assessments.

4) Evidence of Excellent Scientific Achievement: Among students who complete research projects, some will present their work at national or even international conferences, and ultimately, some will become coauthors on peer-reviewed scientific research articles reporting their thesis work. We will track such success stories as further indication of student achievement.

RESOURCES

6.1 ADMINISTRATIVE, PHYSICAL AND FINANCIAL RESOURCES

The program will be administered by PNB and Biology; a need for new administrative resources is not anticipated. All required courses have the capacity to absorb neuroscience students either because a number of programs have not used their allotted seats or because we have obtained specific commitments from individual instructors to open up seats for neuroscience students in their courses. While some of the course-list courses (as opposed to the courses required of all students) have lower enrollment caps, we do not anticipate that this will create problems, as only a fraction of the Neuroscience students will choose to take any particular course-list course from the large number available.

Nevertheless, we do anticipate the need for a few additional teaching assistantship (TA) positions. Specifically, we would like one additional TA every other year for BIOLOGY 4T03, a course-list course that is currently offered only every other year but that we would like to offer every year. Further, we would like five additional TAs for required courses: one additional TA for PSYCH 3SN3 to accommodate the increase in student enrolment that will occur for this currently small course, two TAs for the new course, NEUROSCI 3E03, and two TAs for the new course, NEUROSCI 4S03. Finally, we would like one instructional assistant (IA) to be assigned at 2 hours per week for NEUROSCI 3E03.

6.2 LIBRARY, TECHNOLOGY, AND LABORATORY RESOURCES
The two departments that will oversee the neuroscience program—PNB and Biology—have been managing large numbers of students for many years in multiple programs and have consistently provided high-quality support for research activities, including library and information technology support. The proposed enrolment is small relative to the numbers these departments already handle, and so will not burden the available library or technology resources. The major new resource being sought is a neuroscience laboratory to serve the level 3 Neuroscience Laboratory course (NEUROSCI 3E03). The laboratory course will provide a hands-on introduction to fundamental techniques in neurophysiology and neuroanatomy. The skills and concepts introduced in this course are highly valued in biotechnology, pharmacology, clinical pathology, and other fields in the public and private sectors, and will make students more competitive for immediate employment in these fields or for graduate school. Fortunately, the newly funded Cell Biology Laboratory in the Department of Biology can be used for assignments in the Neuroscience Laboratory course involving immunofluorescence and neuronal cell culture. Therefore, the main items needed to complete the new neuroscience laboratory are neurophysiological recording apparatuses. The estimated one-time setup cost of the laboratory for five neurophysiology stations is $42,500 (see Appendix C2 for the laboratory cost breakdown). The annual consumables cost is estimated at approximately $2,000 for a class of 20 students, or $4,000 for a class of 40 students. An existing Neuroscience Laboratory course (PNB 3L03) — which does not use neurophysiology equipment — will fulfill the Neuroscience Laboratory course requirement until the new laboratory comes into operation.

6.3 FACULTY

With the exception of the proposed new laboratory course (NEUROSCI 3E03) and seminar course (NEUROSCI 4S03), all of the core courses for the neuroscience program are already currently being taught by highly qualified permanent research and teaching faculty, and resources to manage the program are already present within their home departments. We do not foresee the need to hire part time faculty to teach in the program. We envision that NEUROSCI 3E03 will be taught by teaching faculty member Dr. Nikol Piskuric. Dr. Daniel Goldreich has offered to coordinate NEUROSCI 4S03, which may involve guest lectures by several other faculty members.

The neuroscience thesis course (NEUROSCI 4L09), while a new course designation, will take place in the laboratories of individual research faculty; these research labs are already equipped to take on thesis students. Many of these labs are currently under capacity, and turn away thesis applicants due to lack of appropriate preparation. A large number of laboratories across campus, not only in PNB and Biology, but in many other departments in the Faculties of Science and Health Sciences, will be interested in taking honours thesis students from this program. As evidence of the availability of potential thesis supervisors, the MINDS neuroscience graduate program currently lists 79 faculty members.

6.4 ANTICIPATED CLASS SIZE

We anticipate a class size of 20 students per year for the first several years of the program, with the possibility for growth up to a class size of 40 in later years — if resources permit (see Implementation below).

6.5 PROGRAM IMPLEMENTATION

Provided that the program enters the 2016-17 academic calendar, we anticipate the program will accept its first level 2 students in 2017-18. For the first several years of the program, we intend to limit enrolment to 20 students per year; in the likely event of high demand for the program, we will adjust CA admission requirements annually to accept no more than 20 students per year. We will not entertain greater enrollment numbers until we have experience running the new laboratory course (NEUROSCI 3E03) for at least three years in succession. Furthermore, we will only increase enrolment if we have been able to obtain the additional resources needed to accommodate a greater number of students. The main
anticipated additional resources will be faculty and IA resources required to accommodate two sections of NEUROSCI 3E03, as well as additional TAs for PSYCH 3SN3, NEUROSCI 3E03, and NEUROSCI 4S03. Provided that such resources become available, we may allow enrolment to increase to up to 40 students per year.

QUALITY AND OTHER INDICATORS

7.1 ACADEMIC QUALITY OF THE PROGRAM
To assess the academic quality of the program, we will track a variety of performance indicators. These include students’ marks, graduation rates, time to graduation, and placements after graduation. We will also track the numbers of students who obtain undergraduate student research awards (USRA scholarships) and the numbers who obtain authorship on or acknowledgement in scientific publications resulting from their thesis work. We will assess student satisfaction with the program and solicit student suggestions for program improvement via annual surveys, and the program directorship will arrange at least one meeting annually with students in each year of the program to discuss their comments and suggestions. Finally, we will survey supervisors of thesis students, asking them to identify specific conceptual or practical skills that the students either did or did not arrive with; if supervisors identify ways in which students could have been better prepared academically prior to beginning their thesis work, we will attempt to modify course content to remedy the situation. Together, these data will be used as guidelines for ongoing assessment and refinement of the quality of the program.

7.2 INTELLECTUAL QUALITY OF THE STUDENT EXPERIENCE
The program will maintain a high intellectual quality of the student experience through cohort-building experiences that begin early and continue throughout the program, by providing the opportunity for students to interact closely with faculty, and by encouraging a cascades-of-learning approach in which students in their later years can volunteer to tutor those in earlier years.

With respect to cohort building, Neuroscience students will have their own tutorial section in the 2nd-year course, Neuroanatomy and Neurophysiology (PNB 2XB3). Thus, beginning in the fall semester of their very first year in the program (level 2 of their university studies), the approximately 20 Neuroscience students, out of the total approximately 200 students in the PNB 2XB3 course, will have the opportunity to meet and study separately in their own tutorial section.

With respect to faculty interaction, the Neuroscience students will benefit from their attendance in several smaller courses in levels 3 and 4, including the Neuroscience Lab (NEUROSCI 3E03), Neural Circuits (PSYCH 3SN3), Neuroscience Seminar (NEUROSCI 4S03), and the thesis course, in which the students will interact closely with individual faculty members (NEUROSCI 4L09). We plan as well to have optional monthly one-hour tea-with-a-faculty-member opportunities for neuroscience students in levels 2, 3, and 4, in which the students will be able to talk informally with an individual faculty member - and with each other - about careers in neuroscience or any other neuroscience-related topics.

We aim to further enhance the intellectual quality of the student experience by encouraging a cascades-of-learning approach in which Neuroscience students in levels 3 and 4 have opportunities to volunteer as tutors to help with some of the level 2 and 3 courses, including PNB 2XB3, NEUROSCI 3E03, and PSYCH 3SN3.

Finally, we will celebrate the students' achievements at the end of their final year in the program by hosting a Neuroscience Showcase conference, in which all graduating 4th-year Neuroscience students present their capstone coursework in poster format. We will invite all faculty who teach in the neuroscience program, as well as all MINDS graduate students, and all Neuroscience program
undergraduate students in their 2nd and 3rd years, to attend the conference as audience members. This celebratory conference will serve to further develop a sense of cohort among the Neuroscience undergraduates and indeed to foster a sense of fellowship among the greater neuroscience community on campus. We will keep records of all posters presented (students will submit their posters in advance of the conference, in PDF format) as a way to demonstrate and record student achievement.

CHECKLIST FOR NEW PROGRAM PROPOSALS

The following section indicates all the items that are required as part of a complete new program proposal package which includes all the necessary documents. Part I, II and III should be submitted as separate files to iqap@mcmaster.ca.

PART I: COMPLETE NEW PROGRAM PROPOSAL DOCUMENT
- Complete New Program Proposal Template
- Faculty CVs (can be submitted on CD or USB)
- Memorandum(s) of Understanding (Letters of Support) (if applicable)

PART II: RESOURCE IMPLICATIONS AND FINANCIAL VIABILITY of programs TEMPLATE
- Completed
- Approved

PART III: FEES MEMO
- Completed
- Approved
APPENDICES

A  MCMASTER UNDERGRADUATE DEGREE LEVEL REQUIREMENTS
B  CALENDAR COPY AND CURRICULUM SPREADSHEET
C  INFORMATION ON NEUROSCI 3E03: NEUROSCIENCE LAB

Secretary's Note: Appendices A and B have been removed because they contain information outside the scope of the University Planning Committee's mandate.
APPENDIX C – NEUROSCI 3E03: Neuroscience Lab

Calendar Copy
Practical techniques in neuroanatomy and neurophysiology, including brightfield and fluorescence microscopy, neuronal visualization via staining, and invertebrate neuro-physiological recording.

Prerequisites: PNB 2XB3, Biology 2A03, and Med Phys 2C03; or registration in the honours Biology Physiology specialization and completion of or concurrent registration in Biology 3P03; or registration in Honours Biophysics and completion of Biology 3P03. One lecture, one lab (three hours); one term

Appendix C1 – Course Structure and Capacity

The techniques used in this course build on skills from introductory chemistry and biology courses, together with introductory neuroscience and electronics knowledge. As such, this course is suitable for level 3 students with previous laboratory experiences. The course will be offered as a weekly 3-hour lab session plus a weekly 1-hour lecture. A single 3-hour lab session can accommodate up to 20 students. If multiple lab sessions are offered within a semester, a single lecture could serve students from all lab sessions. Each session will be capped at 20 students, allowing 10 students to work in pairs at the 5 neurophysiological recording stations (AD Instruments Neurobiology Teaching Systems – see below) while the other 10 students work on neuroanatomical projects (histology, immunofluorescence, etc.). The number of sessions that can be offered in a given semester will depend on the availability of instructional assistant (IA) time and qualified teaching assistants (TAs). We envision that the laboratory will serve 20 students during its initial years, with the possibility of ramping up in subsequent years, resources permitting. With appropriate teaching and technical support, as many as 5 laboratory sessions (20 students each) could be offered every week.
Appendix C2 – Lab Set-up and Annual Consumables Costs

### One-time setup costs

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<td>Fine Science Tools</td>
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### Annual consumables costs (estimated for 2 sessions per week)

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Proposal for FWI Funding
Faculty Development

Title: Faculty development in techniques for neurophysiology and modern neural imaging

Proposal Lead Name/Faculty: Gillespie/Science

Collaborators/Faculties: Piskuric; Goldreich/Science

Description of Proposed Activity
Please outline the initiative and intended deliverables with specific mention of how the activity:
1. is likely to enhance the competence and effectiveness of this individual (or others) with respect to teaching, research, service and/or leadership;
2. is aligned with the goals of a course/program/department/Faculty;
3. includes a credible approach/framework to evaluate the quality of the expected development and its potential impact;
4. requires the requested funding for success; and
5. includes plans to communicate and disseminate the insights gained with peers and broader McMaster communities.

This proposal consists of two components, either of which alone will significantly advance the competence and effectiveness of Assistant Professor Dr. Nikol Piskuric in teaching and leadership. Together, the two components will synergistically advance Piskuric’s development as a teacher, further the goal of the Departments of Psychology, Neuroscience & Behaviour and Biology to develop a leading undergraduate programme in Neuroscience, and forward the mission of the Faculty and University to promote interdisciplinary and experiential learning for undergraduate students.

The two components:
A) Piskuric will attend the week-long CrawFly workshop for neuroscience educators, held annually in June at Cornell University (Ithaca, NY).

B) We will purchase a neurophysiology teaching station, which Piskuric (together with Goldreich and Gillespie) will use to develop classroom demonstrations and a lab course in neurophysiology, cellular imaging, and optical stimulation.

The CrawFly workshop is taught by a core group of faculty in Cornell University’s Department of Neurobiology and Behavior, all expert neurophysiologists, who have developed a set of extensively tested laboratory exercises ("Crawdads") that are now the leading resource for undergraduate neuroscience labs. The beauty of these exercises (the "Craw" half of the workshop) is that they use invertebrate preparations to greatly reduce initial difficulty, animal ethics issues, and cost in comparison with more traditional neurophysiology labs. The second ("Fly") half of the workshop provides an exciting opportunity for educators to learn optogenetics tools for stimulating nerve cells with light (a hot new method not currently used on campus) and imaging of fly nervous systems with green fluorescent protein (subject of a 2008 Nobel Prize). The lead workshop instructor is the prominent neuroethologist Dr. Ronald Hoy, who has been recognized by the Howard Hughes Medical Institute (HHMI) as an HHMI Professor for his innovative leadership in undergraduate education.

Piskuric will use the requested equipment to refine skills from the workshop and to develop and deliver classroom demonstrations. She will share with Goldreich and Gillespie the details of the invertebrate preparations and imaging and optogenetics tools she has learned, so that all may use these
tools in the classroom. Ultimately, workshop skills and equipment together will seed a proposed new practical laboratory course in neurophysiology, imaging and optical stimulation.

Why use funds this way? Piskuric is a junior teaching stream professor working primarily with students in PNB and Life Science. She excelled as a student at McMaster (receiving a Vanier scholarship and the Governor General’s medal), and she has good conceptual understanding of cellular neurophysiology. However, she has minimal practical experience with the intracellular neurophysiology she teaches in PNB and Life Science courses, and she has never worked with the extracellular neurophysiological techniques that she is expected to teach in her Psych 2E03 and 3J03 courses. Her departmental mentor Goldreich teaches neuroscience in PNB, and Gillespie teaches neuroscience within SCI and PNB. While either Goldreich or Gillespie would no doubt learn (and enjoy!) new techniques from the “Fly” half of the workshop, both are already experienced neurophysiologists, albeit in mammalian systems. Investing in Piskuric is a strategic move in that 1) a larger proportion of the material will be new to her and 2) as teaching faculty she interacts with a larger number of undergraduate students. This proposal thus maximizes potential gain and impact.

Although many colleges and universities throughout the US offer undergraduate neurophysiology labs (and many use some or all of Cornell’s Cradell exercises), to our knowledge, no Canadian university currently offers undergraduate-level instruction with these core neuroscience methods. Piskuric’s training presents a golden opportunity for McMaster: neuroscience is an extremely interdisciplinary field, and many fundamental aspects of neuroscience (e.g., ion channel kinetics, electric circuits, and membrane biophysics, to name a few) are neither intuitive nor easy for students to grasp without real-time examples. A hands-on neurophysiology laboratory experience will greatly enhance the education of our students and serve them well as they pursue post-graduate studies. Developing an undergraduate neurophysiology/imaging laboratory is therefore a key goal of the proposed new BSc program in neuroscience that is jointly sponsored by the departments of PNB and Biology.

In answer to the specific questions posed:

1. This initiative will enhance Piskuric’s competence and effectiveness in teaching and leadership. Through the workshop itself, Piskuric will develop practical competence with methods that she covers in class, increasing her effectiveness as an instructor. Working with other workshop attendees, she will develop a network of neuroscience educators, and through interactions with recognized master instructors like Ron Hoy, she will learn about opportunities and strategies for promoting undergraduate education, better equipping her for leadership roles in curriculum and program design.

2. This proposal aligns with course, program, department, and Faculty goals. Piskuric’s newly acquired expertise will strongly and positively impact her courses in PNB, including especially Psych 2E03 (Sensory Processes) and 3J03 (Visual Neuroscience). Her Life Sciences courses, as well as Goldreich’s and Gillespie’s PNB courses, will also benefit from classroom demonstrations, as the teaching station is mobile and can be brought into the lecture hall. The proposed new laboratory course in neurophysiology/imaging will substantially advance the joint initiative from the departments of PNB and Biology to create a leading BSc programme in neuroscience. Finally, the Faculty’s strategic plan specifically mentions the importance of furthering cross-departmental and cross-Faculty initiatives. Few fields of research are more cross-disciplinary than neuroscience, and this especially true of neurophysiology and cellular imaging. Thus, we expect the laboratory course to appeal to students not only in PNB, Biology and Life Sciences, but also in Biochemistry, Biophysics, Electrical Engineering, and Integrated Science.
3. Experienced neurophysiologists Goldreich and Gillespie will interview Piskuric in order to evaluate the quality of the faculty development, i.e., Piskuric’s practical understanding of single-cell extracellular electrophysiology. Goldreich and Gillespie will observe Piskuric’s in-class demonstrations to judge pedagogical effectiveness and student engagement. Student learning impact will be further evaluated via pre- and post-demo quizzes to assess learning outcomes, and end-of-term surveys to assess student interest and engagement.

4. The departmental investment is sufficient to cover Piskuric’s attendance at the CrawFly workshop in order to develop her expertise. However, the teaching station equipment is needed in order to bring demonstrations into the classroom and to facilitate student engagement and hands-on learning about neuroscience; hence success requires the requested funding.

5. Piskuric will share her learning from the CrawFly workshop with other instructors in PNB in order to develop classroom demonstrations and ultimately to develop a neurophysiology/Imaging laboratory. Because of the interdisciplinary nature of neuroscience, we expect the proposed laboratory to attract students from a wide range of majors in the Faculties of Science, as well as some from Health Science and Engineering.

**Budget**

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<td>Funds Requested</td>
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**Component A (workshop):** (2013 syllabus attached)

- US$1000 Workshop fee (2014 fee)
- US$600 Accommodation for 5 nights at US$119/night (2014 cost)
- US$300 Economy travel to Ithaca (train to Syracuse and shuttle to Ithaca as of May, 2014)
- US$100 Food

**Component B (neurophysiology teaching lab system):** (quote attached)

This equipment constitutes a compact, robust, and inexpensive system for introducing students to a range of core neurophysiological methods. The portable system can be used in classroom demonstrations; it is optimized for use with the “Crawdod” exercises mentioned above; and the accompanying software facilitates the delivery of high-quality laboratory instruction.

**Department Contribution:** The Chair of PNB has committed $3200 toward this project.

**Anticipated Date of Completion**

Piskuric will attend the CrawFly workshop in June, 2015 (we have been advised to register well in advance, as the workshop sells out early every year). Using the neurophysiology equipment available upon her return, she will share her learning with Goldreich and Gillespie. “Completion” will occur with the use of the equipment in classroom demonstrations (as early as fall of 2015 by two or by all three instructors) and ultimately by students in a new laboratory course (2016). Student responses will continue to be collected in order to fine-tune the role of the classroom demonstrations.

**Attached:** 1) letters of collaboration (2); 2) recent CrawFly workshop syllabus; 3) equipment quote
Title: Faculty development in techniques for neurophysiology and modern neural imaging

Proposal Lead: Deda Gillespie

Collaborator: Nikol Piskuric, Daniel Grech

Total envelope: $8200
  A) Faculty development workshop: $2000
  B) Equipment for faculty to use in developing teaching lab: $6200

Departmental commitment: $3200

Funds requested: $5000

Approvals:
Chair, PNB Department

Dean, Faculty of Science
Faculty Development in Techniques for neurophysiology and modern neural imaging
Deda Gillespie

This proposal is endorsed by:

Dr. Robert Baker
Dean, Faculty of Science

May 5, 2014
Dear Deda, Nikol and Daniel,

Thank you for your application for FWI funds to support the project entitled, “Faculty development in techniques for neurophysiology and modern neural imaging.” Yours was one of 53 applications submitted. McMaster has a commitment to supporting faculty development, and we were encouraged by the strong response to the call for proposals and the potential impact of the activities and initiatives that have been put forward.

Members of the FWI advisory group have carefully reviewed all of the submissions using the publicized criteria, and paid particular attention to the evaluation and sustainability of the potential impact. We are pleased to inform you that your project has been selected for funding in the amount of $5000. Some feedback generated by the reviewers is attached for your information. In some instances, there are clear connections between the efforts of diverse groups on campus; we have attempted to highlight these synergies so that your efforts and expertise may complement each other.

We will be following up with you as time passes to request an update on the status of your project. As with the previous rounds of proposals, we intend to draw attention to the initiatives that have been supported through Forward with Integrity funding.

We wish you success as you work toward achieving the intended outcomes of your project and we look forward to learning from your initiative.

Congratulations!

Sincerely,

Patrick Deane
President and Vice-Chancellor

David Wilkinson
Provost and Vice-President, Academic
Dear Deda, Nikol and Daniel,

The reviewers found the initiative to be a worthwhile investment in the development of a new faculty member that could lead to broader impact at the University. It was also noted that there will be an impact on the many students who will benefit from the experiences and equipment gained through this project.

Please respond to this letter with a chartfield string that can be used to transfer the funds. You will find some notes appended to this letter outlining the administration plan for fund transfer.

We look forward to hearing about the results of the project once it moves ahead, so we will be seeking an update from you in the coming months. We will also request a general summary of how the funds have been spent, and a template has been included following this letter so that you are aware of the information that we will be requesting. If you have any questions or concerns, please contact me anytime.

Congratulations!

Best regards,

Laura Harrington  
FWI Project Director  
harrin@mcmaster.ca  
ext. 28658
Administration of FWI grants

Once you have been approved for a FWI grant the President’s office will require chartfield string to indicate the account that will be holding the grant funding and expenses. FWI grants have been designated the Program Codes 30023-30026. Each FWI project within a Department should use a unique program code within this range.

Please work with your local administrator to determine the correct chartfield string to be used based on the items in your budget (e.g. salary, travel). This keeps the tracking of FWI grants separate from regular department activity and helps the recipient to report back to FWI on how the funds were spent. Please note, any unspent funds will be returned to FWI.

If you have any questions or concerns, please do not hesitate to contact us: Laura Harrington, FWI at #28658 or harrinl@mcmaster.ca or Chris Sylvester, Budgeting Services at #24766 or sylvest@mcmaster.ca.
FWI Funding Statement

Name:
Faculty/Area:
Project title:

Please summarize how the FWI funds have been spent:
A summary by broad category is sufficient, line by line accounting of individual expenditures is not required unless specifically requested. Alternatively, please provide a copy of your FAS for the accounts that have been used for the FWI funds.
Salaries and benefits:
Equipment:
Event Costs:
Travel:
Other (please specify):

Balance remaining:
Please indicate how the balance will be spent and when you anticipate that the funds will be exhausted.

Please submit separately a maximum 2-page summary of the results of the project with particular attention to the following details:
1. How has the activity enhanced the competence and effectiveness of an individual (or group) with respect to teaching, research, service and/or leadership?
2. How was the proposed activity/intervention aligned with the goals of a course/program/department/Faculty?
3. How was the quality of the expected development and its potential impact measured and evaluated?
4. How have the insights gained from the intervention/experience been shared with peers and if appropriate, with broader McMaster communities?
5. What are the next steps in this project/initiative? How will the impact be sustained?

The financial and project reports can be submitted to fwi@mcmaster.ca.
(i) Proposal to Terminate the Department of Medical Physics and Applied Radiation Sciences (Attachment I)

At its meeting on October 21, 2015, the University Planning Committee approved a proposal to terminate the Department of Medical Physics and Applied Radiation Sciences. The proposed termination of the Department was addressed in the Faculty of Science Academic Plan, 2014-2019. The undergraduate Medical Radiation Sciences program (offered jointly with Mohawk College) and the Graduate Medical Physics program will continue unchanged. The undergraduate Medical Physics program, however, is currently unsustainable and will be evaluated to determine how best to offer this field of study in the future. The Department’s faculty members will be moved to other Science departments or to the new School of Interdisciplinary Science, but their research, teaching and supervision duties will remain largely unchanged.

The University Planning Committee now recommends,

that Senate approve, for recommendation to the Board of Governors, the termination of the Department of Medical Physics and Applied Radiation Sciences, effective December 31, 2015, as outlined in Attachment I.

For Information

(ii) Proposal to Establish an Honours Bachelor of Science in Neuroscience Program

At its meeting on October 21, 2015, the University Planning Committee approved a proposal for the establishment of an Honours Bachelor of Science in Neuroscience program. A second-year entry program administered jointly by the Department of Biology and the Department of Psychology, Neuroscience & Behaviour, the Neuroscience program is geared towards undergraduate students who are interested in pursuing careers in neuroscience research or other fields built upon a strong interdisciplinary science foundation.

Senate: November 11, 2015
REPORT TO THE UNIVERSITY PLANNING COMMITTEE
from the
FACULTY OF SCIENCE

i. Termination of the Department of Medical Physics & Applied Radiation Sciences,
Faculty of Science (Attachment)

On October 1, 2015, at a Special General Meeting, the Faculty of Science approved a
recommendation to terminate the Department of Medical Physics & Applied Radiation Sciences
(MPARS). As outlined in the Faculty of Science Academic Plan, 2014-2019, the primary concerns
with the continuance of the Department are the severe financial pressures facing the Faculty and
the Faculty’s clear responsibility to allocate scarce resources in a manner that maximizes the
academic quality of its teaching and research programs. MPARS receives a disproportionate share
of Faculty resources while serving very few students while other programs with many students are
under-resourced.

The attached report outlines the history of the Department and its current state, programs offered
and enrolment, information on the Faculty, its programs, and changes over time, the rational for the
termination, and proposed organizational and administrative changes. In addition, the
communication and consultation undertaken to date on the Plan and the termination of the
Department, governance documents related to the establishment of the Department, background
on the creation of the School of Interdisciplinary Science, and a Question & Answers document for
the Department’s students have also been included.

At the beginning of the meeting, the Dean reviewed some key points affecting this closure and
noted the termination was an important component of the Plan. He stressed the reason for the
closure was to better allocate scarce resources to serve the students of the Faculty of Science in
the best way possible. The Dean highlighted some important issues. First, the Medical Radiation
Sciences program that is offered jointly with Mohawk College will continue and will be housed
within the new School of Interdisciplinary Science (SIS). Second, the Medical Physics program will
be temporarily administered by SIS and a working group with representatives from within and
outside the Faculty of Science has been struck to “rethink” how to best offer the discipline of
Medical Physics in the future; the current program is not sustainable. Third, the Medical Physics
graduate program will not change with the exception that a Graduate Program Director will be
named, as a result of a selection committee, who will report to the Dean. Third, if the Department
closes, faculty appointments will be moved to other Science Departments and the Dean will have
one-on-one discussions with each faculty member to determine where each feels their research
and teaching interests fit best. Some may move to SIS, but the School will not be dominated by
any one discipline. There will be no changes to faculty research programs or access to/provision
of space. Similarly, graduate teaching and supervision will continue as before. Undergraduate
teaching would continue as is for the time being as students move through the programs, and as
the Medical Physics program start winds down (the last student is expected to graduate 2020),
faculty members would then need to teach in other units although their teaching may continue to
be related to the discipline of Medical Physics. There is an agreement with the Juravinski Cancer
Center for the provision of teaching resources to the Faculty which will remain unchanged; teaching will be assigned by the Director of the Graduate Program and the SIS Director. Finally, there no expectation of job loss for staff in the Department, but reporting structures and duties will change.

There were a number of concerns raised by members of the Faculty. Some currently appointed to the Department were concerned that this action was being undertaken too quickly and without enough consultation, and thought it would be better to negotiate with faculty members as to their appointments and relevant duties before starting the governance process to close the department. Some said that they may be in a better position to vote on this item at a later time, but that it was not possible currently given the uncertainty of many "critically important details" of their faculty appointments that would affect the rest of their careers. There was also concern raised as to the fact that MPARS faculty members would not have a true home or Chair that could support them as their academic and research needs change, and that the needs of these faculty members would not be realized in other Departmental plans. There was uncertainty felt by some members that for MPARS faculty members their undergraduate teaching would take place in one Department, graduate work would be administered outside of a Department, and with an academic appointment potentially somewhere else.

The Dean indicated he did not feel it appropriate to begin detailed discussions with individual colleagues and Chairs until the overall proposal had at least passed the governance processes with the Faculty of Science. He also stated that he was committed to working through and documenting all of these details with the faculty members affected and would meet with them one-on-one to discuss their concerns and ensure that they were confident that the Faculty supports them during this transitional period and for the future. This work is currently underway. The Dean also repeated that, for each colleague, there would be no change in their research programs, research and office space, or access to facilities on account of this proposed change. He also indicated the graduate programs would continue as before and that, for the next few years, each colleague's undergraduate teaching responsibilities would not change.

After the proposal was thoroughly discussed, the question was called and the matter was concluded with a vote conducted by a confidential paper ballot, with the ballots counted by the University Secretary and witnessed by scrutineers.

It was duly moved and seconded,

"that the Faculty of Science recommend to the McMaster University Senate the termination of the Department of Medical Physics & Applied Radiation Sciences, effective December 31, 2015."

The motion was Carried with 46 in favour, 17 against, and 1 abstention.
Proposal to Terminate the
Department of Medical Physics and Applied Radiation Sciences
14 September 2015

The Faculty of Science Academic Plan, 2014-2019, after much study and consultation with stakeholders, called for the termination of the Department of Medical Physics and Applied Radiation Sciences (MPARS). As described in the Plan, and summarized below, the primary concerns with the continuance of the Department are the severe financial pressures facing the Faculty and the Faculty’s clear responsibility to allocate scarce resources in a manner that maximizes the academic quality of its teaching and research programs. MPARS receives a disproportionate share of Faculty resources while serving very few students. The years since the Department was established have seen dramatic changes in funding and enrollment within the Faculty, and the current situation is neither sustainable nor in keeping with the goal of maintaining high quality programs for our students. The Plan also called for a “rethink” of how to best offer aspects of Medical Physics in the Faculty and a working group will be struck in fall 2015 to undertake this task.

Brief History and Current Status of MPARS
MPARS stemmed from the 1999 establishment of a unit for Medical Physics and Applied Radiation Sciences within the Department of Physics and Astronomy (P&A) (Report to Senate from University Planning Committee, attached). At its onset, two tenured positions and one CLA were associated with the “medical physics group”. Future growth was predicated on success with securing research funding, developing a degree-completion program with Mohawk College, and expanding existing or developing new undergraduate programs.

The Unit was established as the Department of Medical Physics and Applied Radiation Sciences in 2004 (Report to Senate from the University Planning Committee, attached). The faculty complement of the initial unit had grown to 6.5 FTE tenure track colleagues and four colleagues with CAWAR appointments from the Juravinski Cancer Centre (JCC), all of whom were cross appointed (50%) with the Department of Radiology in the Faculty of Health Sciences. Additional tenure track colleagues (3.5 FTE) were added between 2005 and 2010. Since 2011, two colleagues’ requests to be transferred from the Department to other units in the Faculty of Science were approved; one individual left McMaster in 2014.

The current complement consists of eight tenure track colleagues (7.5 FTE) and seven colleagues with CAWAR appointments from the JCC, four of whom are cross appointed to Radiology and three who have 100% appointments in the Department. A total of 16.5 course units are offered by colleagues from the JCC as per the financial agreements established in an MOU between the JCC and the Faculty of Science. A separate agreement covers the details of support for the current Department Chair, who is based at the JCC.

MPARS currently offers an undergraduate program in Honours Medical Physics (including a co-operative option), a direct-entry Medical Radiation Sciences program (Med Rad Sci) presented in
concert with Mohawk College, and graduate programs in Health and Radiation Physics, and Medical Physics. Enrollment in the Honours Medical Physics Program has remained low, with the total fluctuating between 26 and 34 students over the past 10 years (Figure 1). There is no evidence of a potential for long term growth.

Figure 1: Enrollment in Selected Undergraduate Science Programs, 2005 to 2014

Several of the courses in the undergraduate program have particularly low enrollments (Table 1). The low enrollment in some of the required second and third year courses reflects the low enrollment in the program per se. Higher enrollments in some upper year courses reflect the fact that these courses attract students from other programs at McMaster.

Table 1: Medical Physics courses offered (Data from September 2014)

<table>
<thead>
<tr>
<th>Course</th>
<th>Enrolment</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1E03  Physics in Medicine and Biology</td>
<td>170</td>
<td>Y</td>
</tr>
<tr>
<td>2C03  Electronics for Medicine and Biology</td>
<td>8</td>
<td>Y</td>
</tr>
<tr>
<td>2D03  Physical Methods for Life Sciences</td>
<td>9</td>
<td>N</td>
</tr>
<tr>
<td>3C03  Operational Health Physics: Laboratory and Communication</td>
<td>11</td>
<td>Y</td>
</tr>
<tr>
<td>3R03  Computational Medical Physics</td>
<td>15</td>
<td>Y</td>
</tr>
<tr>
<td>Code</td>
<td>Course</td>
<td>Credits</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>4B03</td>
<td>Radioactivity and Radiation Interactions</td>
<td>36</td>
</tr>
<tr>
<td>4D03</td>
<td>Imaging in Medicine and Biology</td>
<td>35</td>
</tr>
<tr>
<td>4F03</td>
<td>Fundamentals of Health Physics</td>
<td>13</td>
</tr>
<tr>
<td>4R06</td>
<td>Radiation and Radioisotope Methodology</td>
<td>17</td>
</tr>
<tr>
<td>4T03</td>
<td>Clinical Applications of Physics in Medicine</td>
<td>19</td>
</tr>
<tr>
<td>4U03</td>
<td>Radiation Biology</td>
<td>25</td>
</tr>
<tr>
<td>4Y06</td>
<td>Senior Thesis</td>
<td>5</td>
</tr>
</tbody>
</table>

Enrollment in the jointly offered Med Rad Sci program has consistently met its intake target, which is currently set at 135 students per year. The McMaster contribution to teaching on the program is concentrated in level one. Courses include Biology, Kinesiology, Mathematics, Psychology and two Med Rad Sci courses as well as electives. Approximately four upper level courses are offered by colleagues affiliated with McMaster, the rest being split between Mohawk College and clinical placements.

Enrollment in the Medical Physics Graduate Program grew for several years after 2005, but since then has declined significantly; the current enrollment is essentially unchanged from that in 2005 (Figure 2). The number of domestic graduate students has dropped by 50% since 2008. The number of domestic students who hold external scholarships is also low. In 2014-2015, none of the 24 students in the Medical Physics graduate programs held a major scholarship, while, in the other departments, the percentage of students holding major scholarships varied from 16% to 50%. Across the Faculty, 30% of our domestic graduate students hold major scholarships.

**Figure 2: Enrollment in Medical Physics Graduate Program, 2005 to 2014**
Changes within the Faculty of Science

The Faculty of Science has seen several important changes since 2005. Total undergraduate enrollment has steadily increased (Figure 1) and our retention rates have improved; overall, enrollment has increased by approximately 50% over the past 10 years. Graduate enrollment rose steadily from 2005 to 2012 and has declined in the past two years; however, the current enrollment is 20% higher than in 2005.

The Faculty has introduced some key programs since 2005. The Integrated Science Program (iSci) was launched in 2009, and this innovative, award-winning program helps attract high quality students to the Faculty of Science and supports experiments in developing innovative ways to teach scientific disciplines. The Life Science Program, by far the largest program in the Faculty with approximately 1,200 students, has grown by 75% since 2005 (Figure 1). In addition, the Department of Kinesiology was moved to the Faculty of Science from the Faculty of Social Sciences in 2009.

As described in the Faculty of Science Academic Plan, all universities in Ontario are facing difficult economic times and there is little evidence that circumstances will change for the better over the next several years. Our current forecasts suggest we will face annual structural deficits of $1.9 million, $2.8 million and $4.3 million from 2015-2016 through 2017-2018. If not addressed, these deficits will result in the Faculty being responsible for an accumulated debt of $12.4 million by 2017-2018. The current situation is clearly unsustainable. The Faculty must move on a number of fronts to generate new revenue, increase efficiencies and allocate resources in such a way that we maximize the academic quality of the research and teaching programs of the Faculty as a whole.

Given 95% of the Faculty’s budget is allocated to salaries, the Faculty must reduce its faculty complement to better match the revenue that it receives. Long term projections indicate the Faculty needs to reduce its complement by approximately 10% or over 20 faculty positions to balance its revenues and costs. The Faculty of Science has been in a “hiring freeze” since March 2014, and launched a retirement incentive plan in 2015 to encourage colleagues to retire earlier than they may otherwise have done.

Rationale for the Termination of MPARS

To prepare for the future, the Faculty entered a planning process “to maintain our reputation and ensure that we continue to improve in a manner that reflects our most fundamental values.” Extensive consultation was sought during the development of the Plan and during the review of its draft (Appendix 1). As described in the Faculty of Science Academic Plan 2014-2019, one of the Faculty’s priorities is to: “offer a broad range of programs to meet the needs of our students.” At the same time, as described in the Academic Plan, the Faculty must “ensure accountability, financial sustainability and opportunity for future growth in a manner consistent with our excellence-based mission.” The Faculty has a very clear responsibility to serve all of its students. Small and highly specific programs are attractive to some students and faculty; however, our ability to offer such programs is limited by the size of our total budget allocation and the need to ensure all programs are of high quality. In the
future, proposals for all new programs will be evaluated in terms of potential enrollment, especially where new courses are required.

The Academic Planning Committee identified the undergraduate Medical Physics Program as particularly problematic. The number of teaching units per instructor in MPARS is very low compared with that in all other units (Table 3). As described above, the majority of teaching by tenure-track appointments in MPARS is performed in the Medical Physics program; faculty members make a relatively small contribution to the McMaster-Mohawk Med Rad Sci program. Overall, the number of students per technical and administrative staff member is also very low compared with that in other units (Table 4).

**Table 3: Average Teaching Units per Instructor**

<table>
<thead>
<tr>
<th>Department</th>
<th>Average Teaching Units/Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology, Neuroscience &amp; Behaviour</td>
<td>1127</td>
</tr>
<tr>
<td>SGES</td>
<td>1020</td>
</tr>
<tr>
<td>Kinesiology</td>
<td>887</td>
</tr>
<tr>
<td>Chemistry &amp; Chemical Biology</td>
<td>812</td>
</tr>
<tr>
<td>Physics &amp; Astronomy</td>
<td>769</td>
</tr>
<tr>
<td>Biology</td>
<td>705</td>
</tr>
<tr>
<td>Mathematics &amp; Statistics</td>
<td>696</td>
</tr>
<tr>
<td>MPARS</td>
<td>170</td>
</tr>
</tbody>
</table>

*Includes faculty members, CLAs, and post-doctoral, sessional and other instructors

**Table 4: Average Teaching Units per Technical and Administrative Staff**

<table>
<thead>
<tr>
<th>Department</th>
<th>Average Teaching Units/Technical and Administrative Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics &amp; Statistics</td>
<td>6,530</td>
</tr>
<tr>
<td>Psychology, Neuroscience &amp; Behaviour</td>
<td>4,586</td>
</tr>
<tr>
<td>SGES</td>
<td>3,230</td>
</tr>
<tr>
<td>Biology</td>
<td>2,216</td>
</tr>
<tr>
<td>Physics &amp; Astronomy</td>
<td>1,817</td>
</tr>
<tr>
<td>Kinesiology</td>
<td>1,641</td>
</tr>
<tr>
<td>Chemistry and Chemical Biology</td>
<td>1,261</td>
</tr>
<tr>
<td>MPARS</td>
<td>367</td>
</tr>
</tbody>
</table>

There is no set enrollment required to justify the existence of a program or department, but given the need to better support the large number of students in our largest programs, it is of the utmost importance that we allocate our limited resources in a manner that best serves the whole. The data indicate that the faculty complement of MPARS grew substantially from 2004 to 2010, but that during this time, there was little or no net increase in the number of
students taught. At the same time the number of students in other programs, and in particular the Life Sciences program, increased dramatically despite a general loss of teaching capacity in the other units.

To ensure Faculty resources are placed in the areas of greatest need and priority, the Faculty of Science has introduced a new system (attached) to evaluate unit-level requests for new faculty hires. The age structure of MPARS faculty members suggests several colleagues will likely retire in the next five years but, given the need to reduce the faculty complement by approximately 10% over the next five years and the need for key positions to support some of our large enrollment programs and our inter-faculty teaching commitments, it is virtually impossible to imagine MPARS submitting a successful proposal for new hires. Supporting the existing undergraduate Medical Physics Program will not be a priority.

The Faculty’s Academic Planning Committee was convinced that the undergraduate Medical Physics program is not sustainable and that, if the area is to be offered by the Faculty of Science, it must be offered in a manner that attracts far more students. Rather than attempt to offer the Medical Physics undergraduate program through an increased use of sessional teaching and have the Department slowly wither away, the Committee felt it best to terminate the Department immediately and reorganize the administration of the programs as proposed below. The Committee saw it as essential to move quickly to ensure a stable administrative platform for the Med Rad Sci program and the MPARS graduate programs.

To address the issue of how to offer undergraduate Medical Physics education within the Faculty, the formation of a working group was recommended by the Academic Planning Committee. The working group, formed of colleagues from several units within the Faculty, and with representation from the Faculties of Health Sciences and Engineering, will be struck by the Dean in 2015; its mandate will be to re-think the Faculty’s offerings in this area, with a report due by February 2016. This working group will explore options for the program, ranging from a simple closure of the program to a proposal for a new, highly modified and sustainable program.

Given the above circumstances, the Faculty proposes that the Department of Medical Physics and Radiation Sciences be terminated on 31 December 2015. This will better allow the Faculty to deploy our existing limited resources to better serve a greater number of students.
Proposed Organizational and Administrative Changes

Proposed Administrative Organization for Programs Currently in MPARS: Should the Department be closed, the Med Rad Sci Program, offered in partnership with Mohawk College and the Juravinski Cancer Centre, will continue in its current form. Administrative responsibilities for this program will be housed in the new School for Interdisciplinary Science (SIS), a proposal for which was approved by the University Planning Committee and is pending approval by Senate and the Board of Governors. Senior colleagues at Mohawk have been consulted and are fully supportive of this change.

The graduate programs affiliated with MPARS will be administered in a way similar to other McMaster interdisciplinary programs. The Faculty has successful examples of this type of governance in the MiNDs and Chemical Biology interdisciplinary programs; setting up such an administrative structure should be relatively simple, given the program will sit wholly within the Faculty of Science. The graduate program will require a Director, associated curriculum and admission committees, and administrative support.

The current Medical Physics undergraduate program will, at least temporarily, be administered by the proposed SIS. However, as described, plans will be made to rethink how to best offer the discipline of Medical Physics at McMaster in the near future. Among other possibilities, the working group may recommend that aspects of the discipline be offered within the revised Life Sciences Program and thus administered by SIS, or aspects of Medical Physics maybe taught in combination with the BioPhysics program and administered by the Department of Physics & Astronomy.

Proposed Administrative Organization for Faculty Members and Staff: Tenure stream faculty members will have their appointments transferred to another unit within the Faculty where their research and teaching interests best fit. Each faculty member will meet confidentially with the Dean to discuss which Department would suit his or her interests best. The Dean will meet with Chairs of the relevant Departments and accommodate each colleague’s wishes wherever possible. However, as described in the proposal for the creation of the School of Interdisciplinary Science (attached), it is essential that colleagues appointed to the new School be broadly representative of all of the disciplines within the Faculty of Science and that no particular discipline will dominate unduly.

Each faculty member will then receive a revised appointment letter that includes the name of the new home Department(s); there will be no change in compensation, status, PDA allocation, etc. Each letter will include a statement that the faculty member’s teaching assignments in all programs currently administered by MPARS will remain similar to what they have been over the past few years until significant changes are made to the program or the program is closed. Teaching of graduate courses will be assigned by the Director of the Medical Physics Graduate Program in consultation with the Chair of the individual’s new Department.

Faculty members will not be expected to make any changes to their current research programs and no changes in research space or facilities are expected because of the termination.
Colleagues may wish to move their offices to be closer to colleagues in their new academic homes and requests will be accommodated wherever possible. Any requested changes to allocations of office and research space will be discussed with the colleague, their Chair, and the Dean or his/her representative.

The existing agreement between the Faculty of Science and the JCC will be maintained, with the exception that the details of the teaching units provided by the JCC will be discussed by the Head of Medical Physics at the JCC, the Director of the School of Interdisciplinary Science and the Director of the Graduate Program.

There is no expectation of job loss for staff currently associated with the Department. While recent vacancies have not been filled, the expectations are that most existing staff will be amalgamated into SIS.
Appendix 1  
Consultation and Communications Surrounding the Development of the  
*Faculty of Science Academic Plan, 2014 to 2019, and Implementation of the Plan’s Recommendations*

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2013</td>
<td>Academic Planning process launched, Academic Planning Committee struck and Terms of Reference distributed to Faculty</td>
</tr>
<tr>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>Five-Year Academic Plans submitted to the Dean and Academic Planning Committee by all Faculty of Science Departments and Programs</td>
</tr>
</tbody>
</table>
| May        | Confidential conversations and meetings with groups and individuals most directly affected by the Academic Planning Committee’s proposal to terminate MPARS, including:  
- Provost  
- PR/Government Relations (May 9)  
- Unifor re MPARS staff (May 12)  
- Chairs of other relevant departments (May 12 and 13)  
- Chair of MPARS (May 14)  
- President of MUFA re MPARS (May 22)  
- MPARS Faculty affected (May 23)  
- MPARS Staff affected (May 23)  
- MPARS Student Groups (Med Phys Student Society) invited for discussions with the Dean |
<p>| May 29     | Draft high level recommendations presented at General Faculty meeting                                                                           |
| June 6     | Open meeting with the Dean and all staff in Faculty to present draft high level recommendations from the <em>Academic Plan</em>; follow-up memo from the Dean describing planning process and next steps sent to all staff distributed June 13 |
| May 30 to June 30 | Meetings with McMaster Science Society and McMaster Students Union                                               |
| June 17    | Meeting with MPARS Department meeting June 17, 2014, to discuss future plans for the undergraduate programs. Question and Answer document provided to staff to clarify questions and help them answer student and other questions. |
| June 24    | Meeting with Associate Dean, Research and John Luxat about relations among McMaster and nuclear industry                                        |
| Early July | Written draft <em>Academic Plan</em> circulated to all members of the Faculty (faculty members, staff and students), with an invitation to provide feedback through dedicated email address. Additional invitations send to leadership of graduate and undergraduate student societies. Draft of Plan |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 18</td>
<td>Meeting with Dean and leads of Graduate and Undergraduate Medical Physics Student Society regarding concerns</td>
</tr>
<tr>
<td>August 22</td>
<td>Open call for feedback period ends</td>
</tr>
<tr>
<td>August and September</td>
<td>Team collates responses and works with Dean and Academic Planning Committee to develop final plan</td>
</tr>
</tbody>
</table>
| Late October | Dean provides feedback to each Department Chair with stated intent that it should be shared with Department faculty colleagues  
Meeting with Dean and MPARS faculty member to discuss alternatives to the termination |
| October 31  | General question and answer session with the Dean at the All-Staff Retreat         |
| November 14 | Meeting with Dean and Vice President, McMaster Student’s Union                    |
| November 19 | Dean presents Academic Plan including proposed closure of MPARS to University Planning Committee for review |
| November 19 | Open meeting with the Dean and all staff in Faculty                               |
| November 20 | General Faculty Meeting with discussion of Plan’s recommendations                 |
| 2015        |                                                                                   |
| March 27    | Meeting with MPARS faculty and staff about plans related to closing of the Department |
| May 28      | General Faculty meeting where termination of Department was raised as part of discussion on the creation of the School of Interdisciplinary Science |
| June 1      | Meeting with Lori Koziol and Paul Armstrong, Mohawk College to discuss implications for Med Rad Sci program on “amendments” to School of Interdisciplinary Science and concerns that students may feel they may have no program |
| September 10 | Meeting with as President & Vice President, Medical Radiation Sciences Student Society to talk about the implications of closing MPARS and opening SIS on students in their program |
| September 15 | Special distribution of the Proposal to Terminate the Department of Medical Physics and Applied Radiation Sciences to MPARS faculty members |
Additional Notes

- The Provost was advised and consulted on the proposal to terminate MPARS throughout the entire planning process
- Details on consultation surrounding the establishment of the School of Interdisciplinary Science are available in the proposal Report of the Working Group for the Establishment of an Interdisciplinary Science Unit in the Faculty of Science, attached
- Since the release of the draft Academic plan, the Dean has invited faculty and staff individually to meet to discuss the future of the Faculty and MPARS
Attachments

1. Medical Physics and Applied Radiation Sciences within the Department of Physics and Astronomy (P&A) (Report to Senate from University Planning Committee).

2. Department of Medical Physics and Applied Radiation Sciences in 2004 (Report to Senate from the University Planning Committee).

3. Report of the Working Group for the Establishment of an Interdisciplinary Science Unit in the Faculty of Science

4. Questions and Answers for Students Regarding the Proposed Closure of the Department of Medical Physics and Applied Radiation Sciences (June 11, 2014)
VI REPORTS FROM SENATE COMMITTEES AND BOARDS

(a) University Planning Committee (Appendix H)

(i) Proposal to Create a Unit for Medical Physics and Applied Radiation Sciences

Dr. Weingarten explained that on December 1, 1999 the University Planning Committee had received from the Faculty of Science a proposal to create a Unit for Medical Physics and Applied Radiation Sciences. The administration for this Unit will be provided by the Department of Physics and Astronomy. The Unit reflects the evolution of the discipline.

Dr. Weingarten moved, and Dean Sutherland seconded,

“that Senate approve the proposal from the Faculty of Science to create a Unit for Medical Physics and Applied Radiation Sciences, as recommended by the University Planning Committee and set out in Attachment I of Appendix H.”

The motion was carried.

(ii) Response to Graduate Council’s Recommendations Concerning New Programmes

Dr. Weingarten noted that the University Planning Committee had endorsed the recommendation from Graduate Council concerning the proposal for a Joint Master’s Degree Programme in Design and Manufacturing and the upgrading of the existing baccalaureate degree programmes in Occupational Therapy and Physiotherapy to the graduate level. Both these proposals had received Senate approval earlier in the meeting.

VII OTHER BUSINESS

(a) Resignation of Senate Member

Dr. George informed Senate that Mr. N. Barakat, the graduate student elected from the Faculty of Engineering, had resigned from Senate effective November 1999. Mr. Barakat had indicated in his letter that “serving at the Senate has been both a pleasure and an excellent experience for me”. Dr. George added that the vacancy left by Mr. Barakat’s resignation would be filled during the February elections.
REPORT TO SENATE
FROM THE
UNIVERSITY PLANNING COMMITTEE

a. Proposal to Create a Unit for Medical Physics and Applied Radiation Sciences

On December 1, 1999, the University Planning Committee received from the Faculty of Science a proposal to create a Unit for Medical Physics and Applied Radiation Sciences: Attachment I. The administration for this unit will be provided by the Department of Physics and Astronomy. The report from the Faculty of Science addresses issues related to resources, administration, academic leadership, and appointments, tenure and promotion matters.

The University Planning Committee recommends,

that the Senate approve the Faculty of Science’s proposal to create a Unit for Medical Physics and Applied Radiation Sciences.

b. Recommendations from Graduate Council

Also on December 1, 1999, the University Planning Committee endorsed:

i) a proposal for a joint Master’s degree programme in Design and Manufacturing, to be offered collectively by McMaster and the Universities of Toronto, Waterloo and Western Ontario; and

ii) a recommendation from the Faculty of Health Sciences Graduate Curriculum and Policy Committee to upgrade the existing baccalaureate degree programmes in Occupational Therapy and Physiotherapy to the graduate level.

SENATE: December 8, 1999
Proposal to Create:

Unit for Medical Physics & Applied Radiation Sciences

Preamble: The research interests of members of this group are inherently interdisciplinary. *Medical physics* seeks to apply techniques and theoretical modelling from the realm of physics primarily to diagnosis and therapies in the context of human health. Generally *radiation sciences* refers to the development, deployment, and analysis of the use of sources of ionizing radiation. There is significant overlap of the two areas, but there are applications in medical physics with no connection to ionizing radiation: MRI, ultrasound, laser-based diagnosis and phototherapy, etc. Under the broad umbrella of radiation sciences are to be found radiobiologists, who study genetic damage by radiation and seek to understand repair mechanisms, and radiochemists who develop specific chemicals containing radioactive isotopes useful in diagnosis and therapy. On the theoretical side are included radiation transport and imaging.

Resources: Initially the financial resources for this group are to be derived from those associated with the medical physics group within the Department of Physics & Astronomy: in 1999 this group comprises two tenured positions and one CLA. In addition the Provost and the Dean of Science have committed to two additional CLAs. One of these positions has been filled by a radiochemist with a joint appointment in Chemistry. The second position may well be filled with a radiobiologist. There are opportunities under which this group may grow (in terms of tenured or tenure-track positions). These include, but are not necessarily limited to: (a) success with major proposals to CFI & ORDCF; (b) development in collaboration with Mohawk College of a degree-completion program for radiation technologists; and (c) expansion in existing, or development of new, undergraduate programs. In addition to these resources which fall under the control of the Faculty of Science, there are significant contributions to the Unit expected from Associate Members: physical and biological scientists employed by Hamilton Health Sciences Corporation, physicists employed by Cancer Care Ontario, and faculty with primary University appointments in Departments other than Physics & Astronomy.

Administration: Because initially this group is below the critical size for a Department and because initially many of the resources are derived from Physics & Astronomy, the administration for the group will be provided within Physics & Astronomy. This administration includes budget and accounts management, some secretarial and technical support, and essential services and supplies. A new accounting structure will be created as necessary.

Academic Leadership: This will be provided by a Director, to be appointed by the Dean of Science in consultation with the Provost and the Dean of Graduate Studies. Among other duties, the Director will negotiate teaching assignments for members of the group with the Chair of Physics & Astronomy and with the Chair(s) of other Department(s) with whom any members have joint appointments. Likewise, the Director will negotiate with these Chairs (and as appropriate with the Dean) the recruitment of graduate students and the allocation of TA resources. The Director will also be responsible for the development of appropriate undergraduate and graduate curricula.
Appointments: The Faculty Appointments Committee for this Unit comprises the Director, the Dean of Science, the Dean of Graduate Studies, and the Provost and will consider the appointments in the established University categories of CLA, tenure-track, Special, CAWAR, and Associate and Adjunct members. Where joint appointments are deemed appropriate then the Faculty Appointments Committees for the other affected Department(s) must be consulted. The "founding members" of the Unit who come from Physics & Astronomy (William Prestwich, David Chettle, and Fiona McNeill) will remain as full members of that Department and will retain their voting rights there regarding undergraduate matters and graduate matters of common interest. They will have no participation in decisions regarding appointments (including tenure and promotion) in the Department of Physics & Astronomy. The absence of their votes in these processes will be treated as 'technical abstentions' in the normal usage of this term in Senate and Board matters. Other members of the Unit will not normally have membership in Physics & Astronomy unless this is specifically negotiated. The Associate Members of Physics & Astronomy who are currently affiliated with medical physics and radiation sciences will have their associate membership transferred to the new Unit and their rights and responsibilities within the Unit will be adjusted as appropriate to each individual.

Tenure & Promotion: For unit members without joint appointments in Departments other than Physics & Astronomy, a Tenure & Promotion Committee will be struck in consultation with the Dean of Science and will normally include two members of the Tenure & Promotion Committee from Physics & Astronomy. When members with joint appointments in other Departments are under consideration then in addition to a recommendation from the above T&P Committee, a separate recommendation must be prepared by the T&P Committee of the relevant Department.

Time Line: Further refinements of this proposal will be taken up by the Faculty of Science Council in September with a view to presentation as a Notice of Motion to the Faculty of Science at its October meeting. A final decision will be taken by the Faculty at its November meeting. Assuming a positive outcome, a motion will then be prepared for presentation to the Senate and to the Board of Governors.

revised Sep 8, 1999
VI REPORTS FROM SENATE COMMITTEES

a. University Planning Committee (Appendix F)
   
i. Recommendation to Establish the Department of Medical Physics 
& Applied Radiation Sciences

Dr. Norrie moved, seconded by Dr. Sutherland,

"that Senate approve, for recommendation to the Board of Governors, 
the conversion of the Unit for Medical Physics & Applied Radiation 
Sciences into the Department of Medical Physics & Applied Radiation 
Sciences as set out in Attachment I of Appendix F, effective July 1, 2005."

Dr. Norrie explained that the Unit for Medical Physics & Applied Radiation Sciences 
was formally recognized within the Department of Physics & Astronomy in 1999. 
Since then, it had grown academically and administratively, and the Faculty of 
Science was now requesting that it be established as a Department with a distinct 
identity to pursue its objectives within the context of the academic mission of the 
Faculty and the University. No additional resources would be required to implement 
this proposal. The University Planning Committee approved the proposal at its 
meeting on December 1, 2004.

The motion was carried.

ii. McMaster Burlington Campus Project Update

Dr. Norrie introduced Dr. Geoffrey Rockwell, who was leading the development of 
aademic proposals for the Burlington Campus project and had made a presentation to 
the University Planning Committee, for information, on its progress.

Dr. Rockwell referred Senators to Attachment II of Appendix F, which proposed a 
campus consisting of three "academic villages" which would accommodate 1,500 to 
2,000 students each, with a graduate student component of 20 per cent. The first class 
would enroll in 2007 and graduate in 2011.

The villages would be small, intimate communities embedded in the City of 
Burlington and with programs extending into the community. The first-year 
experience would be different from the traditional university program, offering a 
close-knit environment intended to help ease the transition from high school to 
university. Proposed programs would address the emerging interaction of arts and 
technology and globalization and cultural studies and would be project-oriented rather 
than curriculum-driven.
REPORT TO SENATE
FROM THE
UNIVERSITY PLANNING COMMITTEE

FOR APPROVAL

i. Recommendation to Establish the Department of Medical Physics and Applied Radiation Sciences

On December 1, 2004, the University Planning Committee approved a proposal that the Unit for Medical Physics and Applied Radiation Sciences be granted departmental status within the Faculty of Science; see Attachment I.

Medical Physics and Applied Radiation Sciences was formally recognised as a Unit within the Department of Physics and Astronomy in 1999; see Attachment II. Since then, it has grown academically and administratively; it is now appropriate that it be established as a Department with a distinct identity that will pursue its objectives within the context of the academic mission of the Faculty of Science and McMaster University. No additional resources will be required to implement this proposal.

The University Planning Committee recommends:

"that the Senate approve, for recommendation to the Board of Governors, the establishment of the Department of Medical Physics and Applied Radiation Sciences from the Unit for Medical Physics and Applied Radiation Sciences, effective July 1, 2005."

FOR INFORMATION

ii. McMaster Burlington Campus Project Update

In September 2004, McMaster University and the City of Burlington entered into a Memorandum of Understanding to develop a proposal for a new McMaster campus in Burlington. McMaster and the City have agreed to a joint planning process on this project. On November 17, 2004, a presentation was made to the University Planning Committee on the McMaster Burlington Campus. The Committee was provided with an overview of the Burlington Campus program vision, planning assumptions and process, and the project planning and approvals timeline.

There will be a presentation on this item at the meeting.

Senate: FOR APPROVAL
December 8, 2004
Proposal for the Unit for Medical Physics and Applied Radiation Sciences to become the Department of Medical Physics and Applied Radiation Sciences

In September 1999 a proposal was written to create the Unit for Medical Physics and Applied Radiation Sciences. At that time the Unit was considered to be below the critical size for a Department, and administration was to be provided within Physics & Astronomy. In 2005, the situation is very different. The Unit is a de facto Department, separate from Physics and Astronomy, and this proposal represents a name change which better reflects the current situation. The Unit is now comprised of the following list of eleven faculty members

Professors
David R. Chettle
Carmel E. Mothersill / Tier 1 Canada Research Chair
Michael S. Patterson / joint appointment with Radiology
Colin Seymour / CLA

Associate Professors
Douglas R. Boreham
Thomas J. Farrell / joint appointment with Radiology
Fiona E. McNeill
Douglas R. Wyman / joint appointment with Radiology

Assistant Professors
Joseph E. Hayward / joint appointment with Radiology
Gerald R. Moran
John F. Valliant / joint appointment with Chemistry

The Unit is also advertising a radiation physics position, and has been given permission to advertise a joint appointment with kinesiology.

Undergraduate Programmes
The Unit administers an undergraduate programme in Medical and Health Physics and in collaboration with Mohawk College a new undergraduate programme in Medical Radiation Sciences (MRSc). The undergraduate programme in Medical and Health Physics is small with approximately 40 students in levels 2 - 5. Enrollment in this first year of the new joint MRSc programme is 122 students.

Graduate Programmes
The Unit administers graduate programmes in Health and Radiation Physics and Medical Physics. There are 2 full-time and 1 part-time students in the Health and Radiation Physics M.Sc programme. There are 12 full-time and 1 part-time students registered in the Medical Physics M.Sc. programme, and 14 full-time students in the Medical Physics Ph.D. programme. A total of 30 graduate students are therefore registered in programmes in the Unit. The Unit is allocated a scholarship budget from the School of Graduate Studies and a Teaching Assistant budget from the Faculty of Science.

Staff
The Unit is allocated a budget from the Faculty of Science and has 3.8 administrative staff. Wendy Malarek is the Administrator for the Unit. Fiona Ahlang and Vera Iarossi are administrative secretaries for Medical Physics. Nancy Brand is the full-time program administrator for the Mohawk-McMaster Medical Radiation Sciences Program.
Proposal to Create:
Unit for Medical Physics & Applied Radiation Sciences

Preamble: The research interests of members of this group are inherently interdisciplinary. Medical physics seeks to apply techniques and theoretical modelling from the realm of physics primarily to diagnosis and therapies in the context of human health. Generally radiation sciences refers to the development, deployment, and analysis of the use of sources of ionizing radiation. There is significant overlap of the two areas, but there are applications in medical physics with no connection to ionizing radiation: MRI, ultrasound, laser-based diagnosis and phototherapy, etc. Under the broad umbrella of radiation sciences are to be found radiobiologists, who study genetic damage by radiation and seek to understand repair mechanisms, and radiochemists who develop specific chemicals containing radioactive isotopes useful in diagnosis and therapy. On the theoretical side are included radiation transport and imaging.

Resources: Initially the financial resources for this group are to be derived from those associated with the medical physics group within the Department of Physics & Astronomy: in 1999 this group comprises two tenured positions and one CLA. In addition the Provost and the Dean of Science have committed to two additional CLAs. One of these positions has been filled by a radiochemist with a joint appointment in Chemistry. The second position may well be filled with a radiobiologist. There are opportunities under which this group may grow (in terms of tenured or tenure-track positions). These include, but are not necessarily limited to: (a) success with major proposals to CFI & ORDCF; (b) development in collaboration with Mohawk College of a degree-completion program for radiation technologists; and (c) expansion in existing, or development of new, undergraduate programs. In addition to these resources which fall under the control of the Faculty of Science, there are significant contributions to the Unit expected from Associate Members: physical and biological scientists employed by Hamilton Health Sciences Corporation, physicists employed by Cancer Care Ontario, and faculty with primary University appointments in Departments other than Physics & Astronomy.

Administration: Because initially this group is below the critical size for a Department and because initially many of the resources are derived from Physics & Astronomy, the administration for the group will be provided within Physics & Astronomy. This administration includes budget and accounts management, some secretarial and technical support, and essential services and supplies. A new accounting structure will be created as necessary.

Academic Leadership: This will be provided by a Director, to be appointed by the Dean of Science in consultation with the Provost and the Dean of Graduate Studies. Among other duties, the Director will negotiate teaching assignments for members of the group with the Chair of Physics & Astronomy and with the Chair(s) of other Department(s) with whom any members have joint appointments. Likewise, the Director will negotiate with these Chairs (and as appropriate with the Dean) the recruitment of graduate students and the allocation of TA resources. The Director will also be responsible for the development of appropriate undergraduate and graduate curricula.
Appointments: The Faculty Appointments Committee for this Unit comprises the Director, the Dean of Science, the Dean of Graduate Studies, and the Provost and will consider the appointments in the established University categories of CLA, tenure-track, Special, CAWAR, and Associate and Adjunct members. Where joint appointments are deemed appropriate then the Faculty Appointments Committees for the other affected Department(s) must be consulted. The “founding members” of the Unit who come from Physics & Astronomy (William Prestwich, David Chettle, and Fiona McNeill) will remain as full members of that Department and will retain their voting rights there regarding undergraduate matters and graduate matters of common interest. They will have no participation in decisions regarding appointments (including tenure and promotion) in the Department of Physics & Astronomy. The absence of their votes in these processes will be treated as 'technical abstentions' in the normal usage of this term in Senate and Board matters. Other members of the Unit will not normally have membership in Physics & Astronomy unless this is specifically negotiated. The Associate Members of Physics & Astronomy who are currently affiliated with medical physics and radiation sciences will have their associate membership transferred to the new Unit and their rights and responsibilities within the Unit will be adjusted as appropriate to each individual.

Tenure & Promotion: For unit members without joint appointments in Departments other than Physics & Astronomy, a Tenure & Promotion Committee will be struck in consultation with the Dean of Science and will normally include two members of the Tenure & Promotion Committee from Physics & Astronomy. When members with joint appointments in other Departments are under consideration then in addition to a recommendation from the above T&P Committee, a separate recommendation must be prepared by the T&P Committee of the relevant Department.

Time Line: Further refinements of this proposal will be taken up by the Faculty of Science Council in September with a view to presentation as a Notice of Motion to the Faculty of Science at its October meeting. Assuming a positive outcome, a motion will then be prepared for presentation to the Senate and to the Board of Governors.
Report of the Working Group for the
Establishment of an Interdisciplinary Science Unit
in the Faculty of Science

6 April 2015

In December 2014, the Dean established a Working Group (Appendix A) to develop a proposal to establish a new Interdisciplinary Science Unit in the Faculty of Science. The call for the Working Group stemmed directly from the Faculty’s Academic Planning, a process that was launched in November 2013 and completed in October 2014, with the release of the Faculty of Science Academic Plan – 2014 to 2019 (Appendix B).

The Plan notes that: “McMaster is well known for its interdisciplinary approaches to teaching and research. Many of the complicated research questions of the day require that we move beyond traditional discipline-based inquiry and many colleagues have recognized the value of reaching out to colleagues in other disciplines to gain from their complementary expertise. Given the importance of interdisciplinary research, exposing our undergraduate and graduate students to this approach will be of benefit to all.”

The Faculty of Science currently offers a number of interdisciplinary instructional programs and it is certainly possible to continue to offer such programs without the creation of an administrative unit. However, the Academic Planning Committee and the IQAP review team for the Life Sciences Program felt the needs of students and some programs were not being met by the current governance and administration. There was a sense that some of the programs were viewed as an “afterthought” or “add-on” to more traditional programs and that discipline-based units did not consider students in such programs as being “our students.” This may lead to some students in such interdisciplinary programs feeling that they are “second class”, and it can also lead to an inappropriate allocation of resources as discipline-based units may view programs based outside their discipline as a “drain” on their resources. The APC was convinced that interdisciplinary programs that rely on the “good will” of Chairs and Directors of traditional programs face uncertainties in the availability of high quality instructors, access of their students to disciplinary courses and involvement with higher levels of administration. The APC thus called for a proposal to establish an Interdisciplinary Science unit that would serve to “stabilize and improve the interdisciplinary undergraduate programs in the Faculty of Science.” In addition, the APC envisioned that the new unit would be designed to function as a centre for interdisciplinary teaching and experimentation with pedagogical approaches, and serve as a resource to advise on interdisciplinary approaches across the Faculty of Science to improve the experience of all students in the Faculty.

The Working Group was specifically asked to:

- Develop an overarching academic vision for the unit and include a proposal for which interdisciplinary programs should be administered by the unit, along with plans for how the unit will serve to advise on interdisciplinary teaching across the Faculty;
• Describe the requirements for physical space that will provide a welcoming environment that students identify as their academic home and ensure opportunities for students, staff and faculty from the different programs to interact in formal and informal settings;

• Propose a system whereby teaching resources that flow to the interdisciplinary programs from other units are acknowledged in the Faculty’s budget plans;

• Propose an initial faculty complement plan (in terms of areas to be covered) and system of governance, where colleagues holding appointments in the new unit will be drawn from across the Faculty and no one discipline should unduly dominate;

• Propose an initial staffing plan and budget;

• Prepare a transition plan designed to minimize disruption to students, staff and faculty.

The sections below provide details on each of these points.

**Academic vision**

To be a national and international centre for interdisciplinary science education with a diverse culture that fosters exploration and discovery, emphasizes experiential, collaborative, and student-centred learning, and that sustains a rich network of community partnerships. We are committed to an interdisciplinary approach to the learning and teaching of science, and to the exploration and application of effective methodologies to enhance student learning and help students reach their full potential.

**Goals**

• Prepare students for 21st century careers by integrating core academic subjects, the latest research discoveries, interdisciplinary themes, and essential skills development with effective instructional approaches.

• Help students learn how to access, understand, employ and synthesize knowledge across disciplines to solve real-world problems and to bridge knowledge gaps.

• Provide students with an interdisciplinary research environment that produces motivated graduates with highly developed scientific research and communication skills.

**Core values**

• Excellence

• Knowledge integration across disciplines and from lab to classroom

• Openness to explore and evaluate new pedagogies

• Inclusiveness

• Creativity
Programs to be administered by the new unit

All programs administered by the new unit—tentatively the ‘School of Interdisciplinary Science’ and herein referred to as the School—will be interdisciplinary in that they combine and integrate knowledge from different disciplines. The degree of interdisciplinarity will vary from program to program, but interdisciplinarity must be a core component of all programs administered by the unit.

The School will house a limited number of the interdisciplinary programs in the Faculty of Science. Several units and combinations of units in the Faculty of Science offer programs that are interdisciplinary in nature. Many such programs are effective in terms of governance and there is no intent to move them to the new School.

It is currently proposed that the School will administer the iSci program, the Life Sciences program and may, in collaboration with Mohawk College, the Medical Radiation Sciences (Med Rad Sci) program. The School may also house the Medical Physics program for the time being. The Medical Physics program is expected to undergo major modifications, and as yet, it is not clear whether the revised program will be best served by being housed in the School of Interdisciplinary Science or whether it should be administered by another unit.

The School will also serve as the administrative home for the Faculty-wide courses: SCI 1A03, SCI 3A03, SCI 3M03, SCI 3RP3, SCI 3EP3, SCI 3EP6. The School will focus on undergraduate programs and, at least initially, will not house any existing interdisciplinary graduate programs. Nevertheless, once well established, the School may want to consider the possibility of graduate, including Professional Masters, programs related to its undergraduate programs.

Service to other programs to enhance all students' learning experience within the Faculty:
The School of Interdisciplinary Science will serve as a resource to other units in the Faculty of Science seeking to develop new interdisciplinary components for new and/or existing courses and/or programs. Instructors working within the School will be encouraged to develop and adopt pedagogical approaches and methodologies that emphasize experiential, collaborative and student-centred learning. The involvement of instructors and teaching assistants from all Science departments in the delivery of the interdisciplinary science programs will greatly facilitate communication, dissemination and adoption of successful teaching and learning strategies throughout the Faculty. The School will also collaborate closely with the Associate Dean (Academic)'s Office, the Science Career and Cooperative Education Office and MIIETL to ensure students are provided with the best available opportunities and guidance.

Space for administration and instruction

Administrative and meeting space: The School of Interdisciplinary Science will be the administrative home for the largest group of undergraduate students in the Faculty of Science, and it is critical that the space and infrastructure associated with the School be readily identifiable and work to effectively meet the needs of these students. At the same time, the space should provide a sense of “home” and “belonging”, and ideally serve as a place where students, staff and faculty can interact outside of scheduled class times.

It is expected that General Sciences Building (GSB) 105, currently the central office for the Department of Medical Physics and Applied Radiation Sciences, will be the central office of the
School. It will house the Director, an Associate Director and the administrative staff described below. The space is somewhat constrained as there are no clear opportunities to include any adjacent space for further development but the existing space will be sufficient for current needs. It was noted that the current administrative space of the Life Sciences Program falls far short of its needs and will be repurposed.

A suite of small offices, both faculty and administrative, and a meeting place in the Thode Library is currently associated with the iSci program. It will be important that the core administrative functions of the School be dealt with in the main office and not diffused across two sites. As well no staff or faculty member should have more than one office. Given the administrative space in the Thode Library abuts teaching space that is currently used by iSci, it may be appropriate to use it to house some teaching staff and TAs associated with the School’s various programs. The School will not have any graduate students of its own and graduate students with TA-ing responsibilities in the School will typically have their desk space in discipline-based units. Thus, it will be important to have an identifiable place for students in the various programs to meet TAs and for the TAs to interact with each other. The above reorganization will provide a better experience for students, allowing them to interact with both faculty and TAs in a dedicated space.

Teaching infrastructure: The iSci, Medical Physics and Med Rad Sci programs have existing teaching infrastructure (teaching labs and equipment) that appears suitable for the needs of those programs. There is no apparent need to modify this infrastructure because of the creation of the School. However, while some components of the infrastructure will continue to be used largely by only one program, none of the existing infrastructure will be viewed as being exclusive to any particular program. As with teaching infrastructure associated with discipline-based units, students in different programs are expected to share common infrastructure.

One obvious need identified is for teaching laboratories for students in the Life Sciences program. The Working Group on the redesign of the Life Sciences Program has identified the current lack of laboratory space and hands-on research opportunities for students in the existing program as a fundamental need that must be addressed in the revised program. The Dean’s Office, in collaboration with the Faculty’s Space Planning Program and the Office of the Registrar, is currently proposing the development of flexible (teaching laboratory/classroom) space to be associated with the new School. Again, while the new space may be used primarily by the Life Sciences students, it may well prove useful in the other programs associated with the School. The additional space will improve educational opportunities for our students.

Faculty complement and teaching resources

Faculty complement: Given the nature of the unit, it is essential that colleagues appointed to the unit broadly represent the disciplines within Science and that no particular discipline will unduly dominate. Also, while it is certainly appropriate for colleagues in the School to have much of their research and some of their teaching focused in particular areas, all must be involved with interdisciplinary approaches.

The School of Interdisciplinary Science’s focus on undergraduate programs calls for faculty appointments in the School to differ in some ways from those in discipline-based units. It is expected that all tenure track colleagues will have joint appointments between the School and an existing unit, although the degree to which the appointment is shared across units will vary from
individual to individual. For example, approximately 50% of an individual’s undergraduate teaching and administrative responsibilities could be assigned by the Director of the School while the remaining undergraduate and all graduate teaching and research-related responsibilities would be assigned by the Chair of the discipline-related unit. Other ratios (e.g., 75:25, 60:40) are possible, with the relevant duties being assigned on a pro rata basis. It will also be possible for some tenure track colleagues to have joint appointments between the School and an existing unit where 100% of their undergraduate responsibilities are in the School. In such cases, the Director of the School will be responsible for the assignment of all undergraduate teaching and general administrative duties, but all graduate- and research-related duties will be assigned by the Chair of the disciplinary unit.

The Dean’s Office will allocate Faculty Career Progress/Merit (CP/M) units to each unit on the basis of each colleague’s percentage appointment in the relevant units. The Chair of the disciplinary unit and the Director of the School will cooperate in the preparation of the CP/M material as is currently done for joint appointments.

In all cases, the Chair of the disciplinary unit will be responsible for allocating research space and resources, graduate teaching responsibilities, access to graduate student applications, etc., as with all other members of the unit. Also, all aspects of a colleague’s research program will be administered by the disciplinary unit and all relevant overhead associated with research contracts, etc., will flow to that unit in the same manner as it does for all other colleagues. However, research programs directly related to teaching should be administered by the School and any associated OH will be directed to the School using the same allocation formula as used for regular research contracts.

Teaching Stream colleagues will be able to hold full or partial appointments in the School of Interdisciplinary Science. For partial appointments, each individual’s undergraduate teaching and administrative responsibilities will be assigned on a pro rata basis by the Director and the Chair of the other unit.

Appointment of the Inaugural Director and faculty members: Wherever possible to appoint the Inaugural Director, the Faculty will follow McMaster’s “Procedures for Selecting Department Chairs.” That document calls for a set number of colleagues elected by the unit and from different ranks, to serve on the selection committee. The issue for the selection of the inaugural Director is that, as yet, there is no existing complement to draw a selection committee from. The Working Group proposes that the Dean, in consultation with colleagues associated with the programs to be included in the School, and with Chairs of existing units, will, with Senate Committee on Appointment’s approval, appoint a Director whose term would begin approximately six months before the formal launch of the School and end two years after the launch of the unit. The Director would then consult with the Dean, Chairs and colleagues associated with the relevant programs, and prepare an initial complement plan for approval by the Dean, Provost and President. The Director may approach colleagues to determine their interest in joining the unit but no individuals will be transferred to the School against their wishes. Colleagues wishing to join the new unit should contact the Director and Dean; all such requests will be considered. The final decision as to whether the Dean will request a change in appointment from the Provost’s Office will be made by the Dean in consultation with the Director and Chairs of relevant units.
Once the School is operational, the Director may request new appointments through the Faculty’s process for this in the same manner as Chairs and Directors of existing units. Prior to the end of the inaugural Director’s term, the Dean will strike a selection committee to identify the next Director; the inaugural Director will be eligible for reappointment. The Director of the School will be a full member of Faculty Council; this will likely require changes to the Faculty of Science bylaws.

**Recognition of resources supplied by other units:** The intent is for the majority of courses offered by the unit to be taught by colleagues appointed to the School. However, the nature of the programs, coupled with some individual colleagues wishes to remain affiliated with disciplinary units, make it likely that, as occurs currently, some colleagues with 100% appointments in a discipline-based unit will teach a course with a designator of one of the programs. This “contribution” of teaching resources will be recognized by assigning the net revenue associated with each course to the teaching unit responsible. This does not imply the budget of any unit will change because of who teaches each course, but the total revenue generated, and a sense of the workload shared by the different units, will be documented and studied in preparing each unit’s budget allocations and considered in all requests for new faculty positions. Contributions associated with recent hires where the hire was predicated on a certain proportion of teaching in one of the interdisciplinary programs, and the previously defined contributions to the iSci program will not be considered as revenue for the discipline-based unit.

It is essential that the regular offering of such courses and continuity of instructors be as stable as courses offered in discipline-based units; such stability will benefit both the School and the existing units. The Director and Chairs of relevant units should work in collaboration with the Associate Dean (Academic) to develop long term plans for the teaching of such courses. Planning should include provision for colleagues on research or administrative leave. The costs of leave replacements for contributed courses will be provided by the contributing unit; the School will be responsible for covering the costs associated with leaves of colleagues appointed to the School.

Any subsequent changes to such plans must be approved by the Associate Dean (Academic). Colleagues requesting buyout for any course offered through the School (as described in the Provost’s recent document) must discuss their proposal with the Director; funding for such buyouts will flow to SIS.

**Governance:** An Associate Director will be selected by the Director in consultation with colleagues and the Dean. Given the diversity of programs offered by the school, it is preferable that the Associate Director have a different disciplinary background from the Director. The Associate Director’s portfolio is best designed by the Director in consultation with colleagues. It may be that the Associate Director is asked to lead the development of new interdisciplinary components for new and/or existing courses and/or programs both within and beyond the School; or the Director may want to assume the primary lead for this responsibility and ask the Associate Director to focus on other tasks. The Working Group recommends against the Director being primarily responsible for some programs and the Associate Director being responsible for the others; it may, however, be useful to appoint faculty program “coordinators” who would be responsible for each program or set of programs and who could serve to form an Executive Council.
The unit will need to develop a Tenure and Promotion Committee as described in Section III 38 of the McMaster University Revised Policy and Regulations With Respect to Academic Appointments, Tenure and Promotion [2012] (YD). That section includes information on the tenure and promotion processes for colleagues with joint appointments. The Director will also need to develop the School’s factors for the CP/M process in accordance with the Faculty Career Progress/Merit Plan. For joint appointments not primarily appointed to the new unit, the Director will provide the required assessment information the home Department/School Chair/Director for CP/M purposes.

Staffing

Wherever possible, staff will be recruited from current positions associated with the relevant programs (iSci, Life Sci, Med Rad Sci, and Medical Physics). There are no plans to reduce the staff complement associated with these programs. Also, wherever possible, staff will be appointed to new positions that best match their existing positions. The Dean’s Office will work with UNIFOR to, wherever warranted, simply transfer staff to new positions without the need for a search. A preliminary staffing plan is attached.

Operating Budget

The Dean’s Office will transfer the relevant proportion of each faculty member’s salary and benefit line from their existing unit to the new unit. Similarly, salary and benefit lines for all existing staff who are appointed to the new unit will be transferred. Many of the existing units in the Faculty are in deficit and their deficits will be reduced by an amount prorated to the salary and benefit lines transferred to the School. The sum of the reduced deficits will be handled centrally and not simply passed on to the School.

The current TA expenditures associated with the component programs will be maintained for the first year of operation. Given the expected changes to some of the programs, this aspect of the budget will require study and possible revision in the future. The Dean’s Office will study the Collective Agreement with CUPE Local 3906 (Unit 1) and meet with the union to discuss any relevant issues.

The Academic Plan noted that the current practice of allocating TA resources to each unit on the basis of the number of graduate students associated with a particular unit creates a situation where some units have an excess of TAs and others have too few relative to the needs of their undergraduate programs. This concern is particularly relevant to the operation of the School as it will not be directly associated with any graduate program. The Associate Deans (Academic) and (Graduate Studies) will study this issue and will make recommendations on more appropriate ways to both support our graduate students with income and teaching opportunities while also fulfilling the requirements of all undergraduate programs in the Faculty. Until their study is complete and formal changes made, the Faculty will use the existing method of assigning TA allocations and selecting TAs. However, in anticipation of changes, the Dean’s Office strongly encourages existing units to work with the new Director of SIS to ensure TAs are assigned in a manner that optimizes their use across the entire Faculty. Similarly, the process of allocating USRAs to the units will continue as before; this process may change in the future but not as a direct result of the establishment of SIS.
An allocation for non-salary costs (for instance, lab and office supplies) will be set by first studying the existing costs associated with the relevant programs. Again, given the expected changes to programs, this will be reviewed and adjusted in the future.

Transition

All students associated with the programs to be included within the School will be contacted as soon as possible after the formal approval for the establishment of the School. Students will be provided with a brief rationale for the change, an overview of how the change may affect them, and contacts in case they have further questions. It will be critical that students realize that the change in administrative structure will not result in any immediate changes to their programs and that they will all be able to complete the programs they enrolled in. The Dean will meet separately with the executives of each of the relevant program’s student societies to discuss the development of the School and address any concerns.

All relevant University offices will be advised on the creation of the unit and the appropriate contact information. The Dean’s Office will meet with the University’s communications office in case they receive any questions from outside the University.

Consultation

Much relevant discussion and consultation occurred during the year-long development of the Faculty of Science Academic Plan – 2014 to 2019. Since the release of the Plan the following have taken place:

- Discussion during General Faculty Meeting on October 30, 2014 and March 26, 2015
- Discussion within departmental meetings called to discuss the Academic Plan
- Release of Draft Proposal and request for written feedback
- Dean’s offer to meet with any unit that wants to discuss the School in detail
- Discussion of selected issues with UNIFOR and CUPE in collaboration with HR and Labour Relations
- Dean’s offer to meet with all staff associated with any of the programs (to come)
- Dean’s offer to meet with student societies affiliated with the relevant programs
- Consultation with other relevant McMaster units outside the Faculty

Required Approvals

- Formal approval by Faculty Council
- Formal approval at General Faculty of the Faculty of Science
- Formal Approval at University Planning Committee (UPC)
- Formal Approval at Senate
- Formal Approval at Board of Directors (BOG)
DRAFT Functional Staffing Plan

Administrator
(oversees all aspects of SIS unit's administration & staff)

Instructional Assistants

Program Administrator/Advisor

Lab Coordinator

Administrative Assistants
(Acad & Admin)

Instructional Assistants: Design, adapt, and modify tutorial session and lesson plans in accordance to the curriculum priorities of the instructor. Provide formal supervision to teaching assistants and other part-time staff. Review current educational research literature to ensure curriculum follows best practices in teaching, education and learning. Organize and coordinate computer-based instruction and tutorial classes. Tutor students in programs. Compose test questions and assignments, and prepare solution sheets for review by others. Organize and monitor the on-line learning environment for courses in an academic unit, department, or faculty by ensuring that the appropriate course content information is made available to students. Write a variety of documents such as procedure manuals, correspondence, and reports. Prepare a variety of lecture materials including presentation slides and handouts. Provide guidance, advice, and solutions to teaching assistants when resolving student inquiries. Provide teaching assistants with appropriate teaching material as specified by the instructor. Ensure accurate grading of assignments is completed by teaching assistants and report discrepancies to the instructor.

Program Administrator/Advisor: Write a variety of documents such as correspondence, reports, and procedure manuals. Contribute to the development of student surveys and disseminate surveys to applicable groups. Review applications for a variety of scholarship competitions and ensure they contain the required information and meet the defined eligibility requirements. Prepare and work in consultation with faculty and staff to coordinate the program timetable. Act as a liaison between faculty and the various individuals and offices within and external to the courses. Inform faculty of established procedures for grade submissions. Schedule student accommodations and resolve scheduling conflicts. Identify and analyze problems with the program and prepare recommendations for review and approval. Advise registered and prospective students of program options and requirements. Review, evaluate, and provide recommendations on applications to ensure students are eligible to transfer into, continue in, and graduate from the program. Act as a mediator between faculty and students when dealing with various issues such as special accommodations, scheduling conflicts, and grades. Gather and compile information required for a variety of documents and reports such as program accreditation, enrollment, and degree audits.

Lab Coordinator: Designs and sets up experiments for undergraduate laboratories. Participates in team in the designing and editing of protocols. Analyzes experimental results. Coordinates space and equipment usage between departments and programs. Creates and maintains maintenance logs, instrument usage logs, waste disposal documents, staff training documents and works orders, standard operating procedures, lab manuals and teaching materials. Conducts database, literature and web searches to find documents and articles used for reference in laboratories. Prepares estimates of time and resources required for experiments. Attends meetings and retreats with faculty to organize and coordinate laboratories with course curriculum. Consults and provides recommendations to investigators and instructors on equipment purchases. Trains staff on the use of laboratory equipment and procedures. Uses hand tools to assemble new laboratory equipment and perform maintenance. Monitors the laboratory budget. Obtains quotes and negotiates pricing with suppliers for bulk purchases and discounts. Ensures that all laboratories are adhering to health and safety standards and procedures. Write a variety of documents such as correspondence, reports, and brochures. Create content for the program website databases and spreadsheets.

Administrative Assistants (Academic & Admin): Supports the Director of the School and the Administrator. Monitor budgets and reconcile accounts. Completes financial forms including travel expense reports, electronic cheque requisitions, purchase orders and journal entries. Develop marketing and advertising brochures. Creates content and maintains the program website. Plans and coordinates a variety of departmental events and activities. Forecast budgets and proposed expenditures for new program proposals and tutorial courses. Receive, send, sort, verify, process and prepare various documents such as purchase orders, invoices, cheque requisitions, receivables, and payables. Process, verify, and balance financial records and business transactions, such as accounts payable, accounts receivable, and payroll. Investigate discrepancies using established procedures. Prepare and generate a variety of scheduled and ad hoc reports. Update, maintain, and verify information in a variety of spreadsheets and databases. Write a variety of formal notes and records using form letters and templates. Answer routine inquiries via telephone, email, and in person that are specific in nature. May redirect complex inquiries to the appropriate area. Maintain filing systems, both electronic and hard copy.
Working Group to Develop a Proposal for an Interdisciplinary Science Unit

Terms of Reference

McMaster University is well known for its interdisciplinary approaches to teaching and research. The Academic Plan for the Faculty of Science calls for the creation of a working group (WG) to develop a proposal for a new Interdisciplinary Science Unit. It is expected that the new unit will provide a permanent home for some of the existing interdisciplinary undergraduate programs including the Intergrated Science, Life Sciences and Medical Radiation Sciences programs. It will also function as a centre for innovation and advice on interdisciplinary teaching across the Faculty of Science. The overall goal is to ensure the Faculty mounts interdisciplinary programs at the highest academic level possible.

The Dean is now striking the WG to develop the proposal; he will work to ensure appropriate communication between this WG and the WG struck to review and redesign the Life Sciences Program. The WG will consult with students, staff and faculty affiliated with the programs that are expected to be housed in the new unit and with Chairs and Directors of all existing Departments and Schools in the Faculty of Science.

The Interdisciplinary Science Unit WG is specifically charged with the following:

- Develop an overarching academic vision for the unit and include a proposal for which interdisciplinary programs should be administered by the unit along with plans for how the unit will serve to advise on interdisciplinary teaching across the faculty.

- Describe the requirements for physical space that will provide a welcoming environment that students identify as their academic home and ensures opportunities for students, staff and faculty from the different programs to interact in formal and informal settings.

- Propose a system whereby teaching resources that flow to the interdisciplinary programs from other units are acknowledged in the Faculty’s budget plans.

- Propose an initial faculty complement plan (in terms of areas to be covered) and system of governance. Colleagues holding appointments in the new unit will be drawn from across the Faculty; no one field should unduly dominate.

- Propose an initial staffing plan and budget.

- Prepare a transition plan designed to minimize disruption to students, staff and faculty.

The working group will begin its work immediately. A report on these discussions is expected to be submitted by March 2015.
The membership of the Working Group will be:

Robert Baker, Dean, Faculty of Science (Chair)
Mic Farquharson, Associate Dean Academic, Faculty of Science
Carolyne Eyles, School of Geography & Earth Sciences and Director, Integrated Science Program
Pat Chow-Fraser, Department of Biology and Director, Life Sciences Program
Wendy Malarek, Administrator, Department of Medical Physics and Radiation Sciences
Kathleen Blackwood, Director, Finance and Administration, Faculty of Science.
Faculty of Science Academic Plan
2014 to 2019

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INTRODUCTION
McMaster University's Faculty of Science is known for its innovative programs, cutting-edge research, leading faculty, and aspiring students. We have earned a strong reputation as a centre for academic excellence and innovation; it is an organization of which to be very proud.

Our vision is to be the leading Faculty of Science in Canada and among the world's best in strategic areas of strength through innovation, creativity, and excellence in research, education, scholarship, and service. The Faculty values people who strive for excellence, think creatively and critically, act responsibly and ethically, and who are respectful of others. We endeavour to foster a collegial atmosphere that is enriching, inclusive, diverse and open.

To maintain and strengthen our position, and to build in a manner that reflects our most fundamental priorities, the Faculty launched a Faculty-wide academic planning process in November 2013.¹ This is a significant time in McMaster and the Faculty's histories. Several factors, internal and external, have the potential to influence the Faculty's future dramatically. Our plan strives to acknowledge those realities and work towards creating a more innovative and sustainable Faculty.

During the academic planning process, individual units, departments and programs, and the Faculty as a whole reviewed the strengths and weaknesses of our academic activities.² An Academic Planning Committee (APC) with representation from all departments of the Faculty oversaw the development of the plan. The Committee familiarized itself with University- and Faculty-wide priorities, and our operating context. It was briefed on the basics of McMaster's activity-based budget model and the overarching financial issues facing the Faculty. It reviewed benchmark data compiled in the fall of 2013, and reviewed and discussed unit-level five-year plans. Meetings were held with Chairs and Directors, as well as student leaders, to further discuss both unit-level and Faculty-wide issues during deliberations. A draft plan was released to the Faculty community of faculty members, staff and students for comment. All comments were considered. This final version of the plan was structured to highlight our key priorities and initiatives.

The result of this community-wide effort is the Plan that follows. Over the next several years, this plan will inform and help guide Faculty- and unit-level decisions on the development of new initiatives and programs, resource allocations, and proposed reorganizations of administrative units. At the same time, the Faculty must remain flexible to allow it to seize new opportunities and deal effectively with unforeseen challenges.

¹Full details on the planning process and committee are available in the document, “An Outline for Academic Planning in the Faculty of Science, 2014-2019,” available at the Faculty’s website.
²An overview of the Strengths, Weaknesses, Opportunities and Threats analysis can be found in the document, “Faculty of Science Academic Plan DRAFT FOR COMMENT AND DISCUSSION”, available on the Faculty’s website. This document will remain available to future reference.
The Plan’s priorities are not presented in order of importance but in a way that flows from undergraduate and graduate education to research excellence and finally to faculty renewal, the keystone of all work of the Faculty.

**Institutional Context and Fundamental Priorities**
The Faculty of Science fully understands the need for this Academic Plan to be consistent with the aspirations and priorities of the University as a whole. McMaster University’s general priorities have been outlined in both the President’s letter, *Forward with Integrity (FWI)*, September 2011 and McMaster’s *Institutional Vision, Mission and Proposed Mandate Statement* submitted to the Ontario Ministry of Training Colleges and Universities (March 2014). The latter document identifies three priorities that McMaster will focus on for the next three years and beyond:

- Strengthen the excellence of our research and our graduate education and training, while seeking opportunities to integrate research more purposefully into our academic mission;
- Develop a distinctive, personalized, engaging and sustainable student experience; and
- Enhance the connections between McMaster and the communities we serve, locally, provincially, nationally and around the globe.

**Faculty of Science Priorities:** The Faculty of Science recognizes three overarching academic priorities that are related to and build on the priorities described in the President’s *FWI* letter and in the current Strategic Mandate Agreement with the Province of Ontario. The Faculty seeks to:

- Provide high quality, innovative and meaningful undergraduate programs that provide opportunity for: small class experiences, “hands on” research experiences, experiential learning, open communication between students and faculty, and exposure to ideas and debates from a range of different disciplines, professions and the general community;
- Offer high quality, innovative and meaningful graduate, professional and post-doctoral programs that promote excellence within specific research and professional disciplines, and offer support and instruction for personal development and the acquisition of skills relevant to both academia and the broader community; and
- Enhance research intensity with the aim of raising the national and international research profiles of all sectors of the Faculty; attract additional research funding from both government agencies and industry; and maintain infrastructure and facilities consistent with leading research intensive universities.

For the Faculty to support these academic priorities successfully, we must develop and follow appropriate approaches, guidelines and practices to guide our actions. The Faculty must:

- Enhance excellence, reputation and outcomes by attracting and investing in high quality faculty, staff and students, and by balancing faculty workloads with respect to research, teaching and service to ensure excellence in all areas,
- Ensure accountability, financial sustainability and opportunity for future growth in a manner consistent with our excellence-based mission, and
• Create a supportive, cooperative and collaborative Faculty-wide environment based on transparent administrative processes.

Financial Environment
The University moved to a new Activity-based Budget Model (ABM) in fiscal year 2014-15. While the new model will not in itself lead to any sudden or dramatic change, it gives the Faculty more latitude in defining its future, and at the same time, a higher level of responsibility for sound financial management. All universities across Ontario, and indeed all across Canada and in many other parts of the world, are facing difficult economic times. There is little evidence that circumstances will change for the better over the next several years. As a result, we must plan to use our limited resources in the most effective manner possible. The demographics in the Faculty suggest that, while there is no mandatory retirement age, a considerable number of our colleagues will leave the University over the next five years. Careful academic and financial planning are necessary to make sure any openings support the Faculty’s renewal in strategic directions.

It will be extremely difficult for the Faculty to implement initiatives devised to meet its overarching priorities, without solving its substantial financial challenges at the same time. Our academic planning is inevitably linked with our financial planning. Our current forecasts, without considering any financial implications of our strategic initiatives, suggest we will face annual deficits of $4.4 million, $4.8 million and $6.2 million from 2014-2015 through 2016-2017. If not adjusted, these deficits will result in the Faculty being responsible for an accumulated debt of $15.4 million by 2016-2017. The current situation is clearly unsustainable and the Faculty must move on a number of fronts to generate new revenue, increase efficiencies and allocate resources in such a way that we maximize the academic quality of the research and teaching programs of the Faculty as a whole.

INITIATIVES
To meet our fundamental priorities and ensure the Faculty’s future is sustainable, the Faculty will work on several key and interlinked fronts to achieve our aspirations.

• Enhance the undergraduate experience by re-developing the vitally important Life Science program and by improving student life by adding more program structure, encouraging interdisciplinary work, and increasing research and experiential opportunities for students.
• Broaden graduate education to help prepare students for a changing landscape.
• Help faculty develop larger and more competitive research programs.
• Allocate faculty positions, and strengthen tenure and promotion practices in ways that maximize the quality of our research and teaching programs.
• Develop practices to better steward and grow our resources, and improve workload distribution among units and individuals.
RENEW THE UNDERGRADUATE EXPERIENCE

The Faculty has experienced considerable growth in undergraduate enrollment and impressive retention rates over the past five years. We are known for our innovative and internationally recognized programs such as the Integrated Science (iSci) Program, and our interdisciplinary approaches to science. Our faculty members have a strong commitment to, enthusiasm for and expertise in undergraduate teaching, with three having won 3M teaching awards in the past five years, and several being awarded the President’s Award for Excellence in Teaching. We lead the McMaster community in the creation of high quality blended learning courses, such as BIOL 1A03 – Cellular and Molecular Biology; CHEM 1A03 – Introductory Chemistry; and PNB 1X03 – Introductory Psychology, with others in development. These courses combine best practices in pedagogy with the latest technologies to enhance the student experience. Recognizing the changing needs of incoming students, the Faculty has created Science 1A03 as a way to introduce first year students to university life, aid in the development of basic skills, and better explain the various program options available in upper years.

To build on these efforts and continue to renew the undergraduate experience to offer a welcoming, engaging learning and research environment for students, the Faculty will undertake the following under the broad headings of New Structures and Improved Opportunities for Students.

New Structures

Redesign the Life Science Program: The 2012 review of the Life Science Program, the Faculty’s most popular program in terms of student numbers, pointed to a large number of very serious concerns, concerns that were repeated during the planning process. To address these issues, the Dean’s Office will strike a broad-based Working Group to redesign the Life Science Program.

Among the areas it will address are the high enrollment of the program; large class sizes can limit the range of learning opportunities. The program’s flexibility, while a strength for some who appreciate the opportunity to select from a wide variety of options, can be a weakness, as students can become lost or graduate with an unfocused degree. They also may miss out on the community-building experience of taking many courses in common with the same group of students. Confusion exists over the “identity” and “purpose” of the program and there are concerns about “overlap” and “duplication of courses” with other life science focused and environmental science programs.

The Working Group will consider focusing the Life Sciences program on humans and ensure it has a clear, distinct identity and purpose. It will investigate the creation of “streams” to help generate cohorts of students and provide more structure to better direct students to potential careers or areas for future study. Several of our Human Geographer colleagues in the School of Geography & Earth Sciences are experts in areas of Health Geography, Health Policy and Global Health, and it may be appropriate to develop a stream in this area of strength. At the same time, the group will consider ways in which other units, particularly those with teaching capacity, can support the various streams. It will also consider the possibility of engaging
colleagues from the Faculty of Health Science as well as relevant professionals from the local area to teach selected aspects of the program.

**Establish a New Interdisciplinary Science Unit:** McMaster is well known for its interdisciplinary approaches to teaching and research. Many of the complicated research questions of the day require that we move beyond traditional discipline-based inquiry and many colleagues have recognized the value of reaching out to colleagues in other disciplines to gain from their complementary expertise. Given the importance of interdisciplinary research, exposing our undergraduate and graduate students to this approach will be of benefit to all.

To improve and better integrate the interdisciplinary undergraduate programs within the Faculty of Science, the Faculty will strike a second working group to design a new undergraduate Interdisciplinary Science unit. The unit is expected to house the Life Science, Medical Radiation Science and iSci programs, as well as certain Science courses (1A03, 3A03 and 3M03), and the science experiential and research practicum courses associated with the Science Career & Cooperative Education. Uniting these programs and courses under the umbrella of a single unit will allow for a flow and sharing of educational resources and experience. More important, the new unit will be designed to function as a centre for interdisciplinary teaching and innovation, and serve, not only the programs and courses it houses, but advise on interdisciplinary approaches across the Faculty of Science.

The Working Group will plan for a suitable physical location – a welcoming environment that students identify as their academic home and that provides opportunities for students, staff and faculty from the different programs to interact in formal and informal settings.

Colleagues holding appointments in the new unit will be drawn from the full range of disciplines in Science to ensure no one field dominates. Tenured, tenure track and teaching stream faculty will hold partial or 100% appointments in the unit; tenured and tenure track faculty will hold a graduate appointment within an existing graduate unit.

**Disestablish the Department of Medical Physics and Applied Radiation Science:** The Faculty will develop a proposal to recommend the disestablishment of the Department of Medical Physics and Applied Radiation Science. This act in no way stems from concerns over the quality of the academic programs of the Department, which are widely respected by both industry and academia working in this area, and have graduated successful alumni. However, the Medical Physics undergraduate program has suffered a persistently low enrollment, and in the current environment, the Faculty needs to better balance its use of the limited resources available.

Medical Physics education, training and research will continue within the Faculty of Science. The very successful Medical Radiation Sciences (Med Rad Sci) Program, offered in partnership with Mohawk College and the Juravinski Cancer Centre, will continue in its current form and administrative responsibilities for this program will be housed in the new interdisciplinary unit being planned. The current Medical Physics program will be housed within the new unit;
however, plans will be made to rethink how to best offer the discipline of Medical Physics at McMaster in the near future. It may be that aspects of the discipline will be offered as a stream within the revised Life Science Program, or in combination with the BioPhysics program in Physics.

Our current graduate programs will continue to be offered in a form very similar to the current program and administered as an interdisciplinary program. Faculty members will have their appointments transferred to another unit within the University where their research and teaching interests best fit. Faculty members will be able to maintain their current research programs and no changes in laboratory space are expected. Faculty may wish to move their offices to be closer to colleagues in their new academic homes.

**Improved Opportunities for Students**

**More Research and Experiential Opportunities for Undergraduate Students:** McMaster is a research-focused student-centred institution. Our faculty makes a tremendous contribution to this philosophy with their commitment to being complete scholars and blending their research with their teaching. The Faculty of Science has worked to develop research and experiential learning opportunities for its students, especially those in Level IV, but it can do more for students in Levels II and III. It can also improve access to research opportunities for students in our most popular programs, such as the Life Sciences Program.

Exposure to direct research opportunities in Levels II and III will help students decide whether research is a career option and direct experiences will help them better understand content in upper years of their undergraduate programs. These opportunities will also help them develop collaboration skills, skills increasingly valued in both academia, and industry and other sectors.

The Faculty will strike a third Working Group to identify and implement ways to incorporate more research opportunities (both individual and collaborative) for all students in the undergraduate curriculum. For instance, the planning process identified novel ways to encourage colleagues to host more undergraduate students in their labs, to generate research opportunities for students earlier than the fourth year, and to design shared undergraduate research spaces for individual and group projects.

This Working Group will also develop methods to encourage and improve experiential learning opportunities, such as cooperative education and community engagement, and interaction with professionals both in academia and outside it. Developing a broad range of opportunities is critical. For instance, students who arrive at university with an interest in human health and are placed in health care clinics clearly gain valuable experience; however, students exposed to areas of study or work outside the clinic may uncover unexpected and surprising interests and strengthens.

**Increase Access to Selected Honors Programs:** Many students currently enrolled in three-year programs would prefer to enroll in an Honours program but can’t because, after completing
first year, their GPAs are lower than required for entry in Level II programs. Other students find
that they are unable to enter programs in their department of choice because of limits on
program enrollments and the high GPAs required for entry. These students often “shadow”
their Honours program of interest by taking the appropriate courses, and approximately 35% of
these students succeed in entering the Honours program in a subsequent session.

To help students begin second year in an Honours program, the Academic Planning and Policy
Committee (APPCC) will work to ensure all units remove the enrollment limits for at least one
Honours BSc program. Units should also review the admission requirements for their
program(s) to ensure a less restrictive set of course entry requirements, and accept students to
the program(s) with a CGPA of 5.0.

Optimize TA Placement to Improve the Student Experience: TA allocations to units in the Faculty
of Science are based largely, if not solely, on the number of graduate students associated with
that unit. Providing opportunities for graduate students to serve as TAs is crucial as TA-ships
offer valuable teaching experience and serve as a source of income. Basing the allocation of TA
resources purely on the number of graduate students in a unit creates some unintended and
undesirable consequences, where the number of graduate students does not align with the
numbers of undergraduate students in the unit. This leaves some units with too many TAs and
other units with not enough.

To improve the undergraduate experience and offer the best training opportunities for our
graduate students, the Faculty will ask the Associate Deans (Academic) and (Graduate Studies)
to document how various units allocate and utilize TA resources within their undergraduate
programs, and make general recommendations on the appropriate ratio of TA to undergraduate
numbers and needs. These recommendations will take into account the wide variety of courses
across the Faculty and the different needs for TA resources. From this will come a system for
allocating TA resources and TA opportunities across the units that continues to provide
experience and a means of support for our graduate students while enhancing undergraduate
programs, particularly the interdisciplinary undergraduate programs, by delivering better support
and access to the best TAs for the program.

Supporting Student Life Outside the Classroom: Attending university for the first time is a huge
transition for our students and recent research indicates that increasing numbers of students
suffer from issues related to mental health. At a University-wide level the Associate Vice
President (Students and Learning) is currently developing a “McMaster Student Mental Health
and Well-Being Strategy”. It is of prime importance that our instructors engage with the
strategy and the relevant offices to better identify students at risk and be sure they are aware of
the accommodations and counseling available to students.

At a Faculty level, the newly developed Science 1A03 course (described above) is designed to
better prepare students to adjust to university and the next stages in their lives. For instance, it
introduces the concepts of stress management and time management, and identifies existing
university resources to provide help and better prepare students for success. We will actively
pursue the development of “cohorts” within our larger programs to help make students develop a better sense of belonging, and ease tensions and stress. The Associate Dean (Academic) will work with the Registrar to determine whether it is possible to group students in the same lab sections across courses and even years of study. Mentoring of a cohort of students by more senior students works well in some programs. Information about the “buddy” system used in iSci will be given to other units to see whether the system can be extended to other programs.

**REINVIGORATE GRADUATE PROGRAMS AND OPTIONS**

The Faculty attracts high quality graduate students, with 20% of our domestic students holding Tri-Council or Ontario Graduate Scholarships, and an additional 10% of our domestic students holding one of a range of other awards. Our graduate programs have experienced strong growth of 16% in the five-year period from 2008 to 2013, demonstrating that students appreciate our innovative programs and track record of cutting edge research. For instance, faculty members are leaders of three CREATE grants (Molecular Imaging Probes Program, BioInterfaces Training Program, and Integrated Development of Extracellular Matrices), and many more participate in other CREATE programs led by collaborators at other universities. These networks broaden the experiences and types of training we can offer our students. In addition, the Faculty is home to several interdisciplinary graduate programs—Astrobiology, Chemical Biology, the McMaster Integrative Neuroscience Discovery & Study (MiNDS), and the School of Computational Science and Engineering, with a new PhD program in Statistics planned. The Faculty will make it a focus of the next few years to increase our numbers of graduate students, develop more opportunities for graduate students through new programs, and provide better professional development for students in all programs.

**Increase Graduate Student Enrollment:** Graduate enrollment in the Sciences has risen rapidly since 2005, but this growth is starting to plateau. Training of highly qualified graduate students is a fundamental academic priority of our Faculty, and has an enormous impact on our faculty colleagues’ research programs. We must work to maintain and build our graduate enrollment. This is a challenge given the current strain on our resources but the Faculty sees this as a critical activity to maintain excellence.

To achieve this, the Associate Dean (Graduate Studies) will strike a Working Group to study the current graduate recruiting practices across the Science units. The Working Group will study the obstacles that prevent colleagues from accepting additional graduate students, and make recommendations on how to attract more students, and the most promising students, in particular, those students who have, or are likely to attract, major scholarships.

In conjunction with these efforts, the Dean’s Office will examine the current level of support offered to graduate students across the various units to ensure the Faculty is providing a fair level of support to all students.
**Develop Professional Masters Programs:** As society becomes more complex, Professional Masters programs are in increasing demand, offering people in mid-career opportunities to develop new skills, and new graduates opportunities to focus on specific career areas. We are in an excellent position to answer this need. The Faculty has recognized expertise in many areas – environmental monitoring, genomic analysis, ergonomics – where professional masters are in demand. Indeed, the Masters in Financial Mathematics (M-Phimac) is already a popular program. Not only will these offerings provide opportunities for attracting new students, they will also allow us to make links with industry and government agencies that will offer increased opportunities for research partnerships and impact, and help us develop more options of experiential education.

The development of Professional Masters programs is largely the responsibility of the individual units. To support these efforts, the Faculty, in particular, the Associate Dean (Graduate Studies) will work with units and the School of Graduate Studies to develop such programs. Other central University support, such as from the Provost, will also be encouraged. The Dean’s Office will ensure that, with exception of a small overhead, resources generated by the new programs will flow directly to the units involved. The Faculty will aim to develop three such Professional Masters by July 2015 and possibly two or three more in the following year.

**Enhanced Professional Development for Graduate Students:** While some of our graduate students will take up positions in academia, the majority will choose to work in research and leadership positions in industry, government agencies, non-governmental agencies, and other sectors. These students, while requiring the same intense exposure to research in their chosen discipline, also need to enhance skills not necessarily developed in traditional programs. Skills such as collaboration, communications, leadership skills, and the ability to network with government, non-governmental agencies and industry will help position our students for successful careers. With the rapidly changing landscape in universities around the world, all graduate students will gain from developing these essential skills.

The Associate Dean (Graduate Studies), in concert with Chairs and Associate Chairs responsible for graduate studies, will work with School of Graduate Studies (SGS) to participate and/or help develop skills programs for graduate students. SGS, in association with graduate schools at several other Ontario universities, recently launched several modules designed for graduate students (www.mygradskills.ca). The Faculty will study the existing modules and determine whether more Science-specific modules are needed for our students.
FOCUS ON RESEARCH EXCELLENCE

The Faculty of Science takes pride in the excellent work of our researchers. We are home to many outstanding researchers and McMaster is recognized as one of the top research intensive universities in Canada. Our colleagues attract solid support from the Tri-Councils, especially NSERC and SSHRC, and several faculty members attract extremely high levels of support from industry and government agencies. We are recognized by our peers, with 13 faculty members who are Fellows of the Royal Society of Canada and many colleagues who serve as journal editors, on NSERC and CIHR review panels, and government advisory boards. Colleagues are leading cutting edge, multi-million dollar projects, such as the Canada Foundation for Innovation (CFI)/Province of Ontario-funded Biointerfaces Institute, the McMaster Institute for Music and the Mind LIVElab, and the Small Angle Neutron Scattering (SANS) instrument, and the Centre for Probe Development and Commercialization (CPDC), funded by Network of Centres of Excellence and the Province of Ontario. Others head major projects funded by the Automotive Partnership Canada and SSHRC Partnership Grant programs. Highly achieving faculty members are joining the McMaster community, attracted to our intense research environment.

To remain strong, the Faculty must not rest on its laurels. The Faculty will continue to use the benchmarks developed to support the Academic plan and other data such as publications and citations, patents, invention disclosures and other measures to monitor our research successes and set goals. The Faculty encompasses a wide breath of research in terms of field and degree of application; yet, there are common features. Modern scientific research is dynamic, complex, collaborative and competitive in nature, and the external funding environment is always in flux. For instance, governments, industry, and the community in general see research as driving innovation and economic development, and are expecting short to medium term results for their contributions. Yet, discoveries often happen over the long term and come in unexpected ways. We must be prepared to respond to challenges presented to us.

Focus Research Activity: To thrive in this highly competitive funding environment, the Faculty of Science has created a “Strategic Research Plan for the Faculty of Science”. The goal of the Science SRP is to streamline the research enterprise while supporting key areas of growth in the Faculty. The plan builds on current strengths and identifies emerging areas of interdisciplinary research where we need to encourage intensity and expertise. The Science SRP makes it clear that to succeed during economically challenging times, the Faculty must focus its efforts to support leading edge research while managing expenditures prudently. As such, new positions, programs and initiatives in the Faculty of Science will be tied to one or more of the four identified areas of focus: Biological Systems and Health, Environmental Science, Fundamental Exploration, and Materials Discovery and Characterization.

Increasing and Broadening Our Funding Sources and Opportunities: The funding environment has become increasingly more competitive and targeted over the past decade. Colleagues are facing challenges securing research funding as a result. The Dean’s Office and the Associate Dean, Research & External Affairs (Associate Dean, Research) will continue to support the central University’s and other groups’ efforts to stress the importance of basic and fundamental research, and the need for funding in this area to governments and other stakeholders.
For some colleagues, however, external changes have created opportunities to broaden their research funding base. In fact the very nature of their research programs make such partnerships a good fit and some faculty members have formed strong research links with industry, governmental agencies, and/or non-governmental organizations. These links, not only provide direct support for research and graduate students, but can also generate new research questions to explore; create conduits for knowledge transfer, mobilization and commercialization; initiate cooperative and experiential learning experiences for all students, and increase employment opportunities for graduates.

Some colleagues are looking to explore the possibilities but do not know where to start. To leverage our successes and strengthen our links with outside partners of all types, the Faculty will initiate a series of programs to support researchers who elect to pursue partnerships. The Associate Dean, Research will offer a financial incentives program to support new partnerships; an informal mentorship program supported by the Faculty to link experienced faculty members with those in the initial stages of pursuing partnership; and a program of talks led by faculty members currently involved in partnered research. These talks will focus on skills such as how to initiate partnered research, and how to grow and nurture partner relationships.

To help increase the success of large, complex grant proposals, the Dean’s Office and the Associate Dean, Research will offer strategic advice and financial support to those projects aligned with the Faculty’s research priorities, especially in cases where such funding will influence the outcome. This funding should not be viewed as direct, ongoing support for any individual project. The Faculty will also encourage interdisciplinary research, often at the core of successful partnership projects. Faculty members have a long history of productive collaborations across disciplines and Faculties, especially Health Sciences and Engineering, and many discoveries are made at the intersections of disciplinary work. Wherever possible, the Faculty will work to modify its and the University’s policies and practices to further encourage and promote interdisciplinary research.

The Associate Dean’s Office will also work closely with the central research offices – Research Office for Administration, Development and Support (ROADS) and McMaster Industry Liaison Office (MILO) – to strengthen these resources for researchers.

Finally, and as important as the above, the Faculty and units will work with researchers to increase the number of Tri-Council grants held, as well as their monetary value. This measure of success is a vital building block in the career of any Canadian researcher, and the overall level of Tri-Council funding determines the Faculty’s share of funding from CFI, the number of Canada Research Chairs available, and funds from the Federal Indirect Costs Program. Chairs and the Office of the Associate Dean, Research will redouble their efforts to aid colleagues in writing more competitive grant applications.

**Managing Infrastructure Needs:** Many research programs require complex and highly technical, central platforms. Such facilities are often required by multiple users and expensive to operate. The Faculty recognized the need for and importance of such infrastructure through its ongoing
support of capital and operating costs. The Faculty, however, needs to focus its limited resources (cash, CFI allocations, space) and exploit these resources to the utmost. All of our research platforms must operate as effectively and efficiently as possible. The Associate Dean, Research and the Director, Finance & Administration of the Faculty will work with Chairs; Associate Deans, Research from other Faculties; the Office of the Vice President, Research; and directors of the research units themselves to ensure they have effective business plans and clear reporting structures, and do not duplicate University or other platforms available in the region. New facilities, funded for instance through CFI or other agencies, must consider sustainability and present a full, detailed business plan (as determined by the Faculty) before they will be endorsed.

SUPPORT FACULTY RENEWAL
The Faculty’s ability to achieve its goals for teaching programs and research rests, more than anything else, on the quality of its faculty members. Attracting and retaining high quality faculty are critical to our success. Faculty members are the foundation of all of our efforts to renew the undergraduate experience, reinvigorate graduate studies and drive research excellence; simply, they are essential. However, as we plan to support our faculty members and realize our ambitions, we face challenges with our resources.

Allocating Faculty Appointments: Demographic analysis indicates that there may be many retirements in the Faculty over the next several years, allowing us to plan for faculty renewal. However, financial forecasts indicate the Faculty may need to decrease our faculty complement over the next five years. Thus, it is imperative that we allocate new faculty appointments to achieve the maximum benefit for the Faculty as a whole and ensure the process for allocation is transparent.

The Dean’s Office will establish an annual process to review requests for faculty positions in terms of their importance to the teaching and research priorities of the unit and the Faculty as a whole. Vacancies will not be automatically replaced. A broad-based committee will evaluate all proposals in light of the current environment, the best data the Faculty can provide, the proposed position’s strategic importance to the Faculty’s identified research and teaching priorities, and the Faculty’s Strategic Research Plan. The committee will then advise the Dean on which positions are of strategic importance. In special and unusual circumstances, the Dean’s office may approve an off cycle search. To help with the transition to a smaller faculty complement, limited and temporary funding for short term sessional appointments will be made available where possible.

Changes to Tenure and Promotion Processes: The Faculty’s tenure and promotion (T&P) processes are of the utmost importance to the maintenance of high quality research and teaching programs. Being able to recognize an individual’s contribution to the Faculty is a critical component to our success. To ensure the Faculty T&P Committee has the best information to make meaningful recommendations, the Dean’s Office, in combination with the Faculty T&P Committee, will design a detailed set of expectations for T&P dossiers in keeping
with the University’s yellow document. This will allow the Faculty T&P Committee to focus on the essential academic qualifications and achievements of our colleagues. The Dean’s Office, in collaboration with the Faculty T&P committee, will also review the unit-level committee structures and processes, and recommend structures and processes to ensure unit-level committees are in the best position possible to make fully informed, fair recommendations on the academic merits of each candidate.

**Encourage Diversity in Faculty Hiring:** Given the evidence that students benefit from being taught by role models with whom they identify, whether it be a woman professor or someone from a similar ethnic group, it is vital to the future of undergraduate and graduate teaching programs that the Faculty encourages the hiring of excellent candidates who reflect the diversity of our student population, particularly with the hiring of more female faculty members. Given the importance of attracting top quality teachers and researchers to our Faculty, it will be important to ensure that we actively recruit from a diverse population of potential applicants, recognizing and valuing differences in age, gender, sexual orientation, dis/ability, religion, race/ethnicity, and other social characteristics.

Encouraging applications means much more than broadcasting advertisements across various publications and web sites; the Faculty of Science at McMaster must be seen as a welcoming and positive place for all qualified people to work and prosper. To do anything less will weaken our chances of attracting the very best scientists. Creating a family friendly environment should be a top priority of the Faculty. Efforts including support for access to child care on campus, support for parental leave, leadership development for female faculty members, mentoring programs and ultimately flexibility for faculty members trying to balance their workloads with family responsibilities will go far to create such an environment.

To make the best appointments possible, it is vital that Chairs and search committees fully understand how various practices and processes can influence the perception of quality during the review of letters of application, CVs and letters of reference. There is a rich literature on these subjects and it will be to our Faculty’s advantage to take heed of it. The Dean, or a Dean’s designate familiar with the issues and practices related to diversity in hiring, will serve as an advisor on each search committee.

The issue of faculty diversity has attracted considerable interest across the University in the past year; it is possible that a University-wide working group or committee will be struck to pursue the relevant issues. The Faculty of Science will be fully engaged with any such group; if necessary, the Faculty will develop a working group on its own.

**Sharing Workloads and Teaching Responsibilities:** Perhaps the most defining and fundamental feature of universities is that students are taught by faculty who are actively involved in leading-edge research. This clearly distinguishes modern universities from colleges and other institutions designed primarily for teaching and training, and from research institutes aimed primarily at research.
Department Chairs must have some flexibility in assigning teaching responsibilities to colleagues, and in general, the extent of an individual’s research program should have some bearing on that individual’s teaching assignments. To ensure our faculty’s activities are consistent with the fundamental aim of students being taught by active researchers, all faculty are expected to teach a minimum of 6 units per year in undergraduate and/or large required MSc or Professional Masters courses. Colleagues with a very limited or no research program, and who supervise few, if any, graduate students relative to the norms of the discipline, will be expected to take up additional teaching and/or administrative responsibilities as described in the Provost’s “Statement on Balancing Teaching, Research and Service Contributions for Tenure-Stream Faculty Members” (April 2014). This will better share the workload among colleagues and reduce the need for sessional teaching.

Colleagues who have won awards from a defined list of prestigious fellowships (e.g., Steacie and Killam) and awards (certain CIHR programs) that normally cover a large proportion of an individual’s salary will be granted teaching release to allow them to hold these fellowships and awards. Newly appointed CRCs will be expected to fulfill the minimum teaching requirements described above, but will receive research support equal to the value of a sessional salary required to cover the usual three units of buyout.

In addition, colleagues who accept administrative positions (Chairs and Associate Chairs) within their units may, at their Chair’s discretion, be eligible for some reduction in teaching responsibilities. Chairs are encouraged to do some course-based teaching but the degree of involvement will be left to their discretion. Chairs will also have the flexibility of providing a maximum of 6 units total across their unit for administrative work of the Associate Chairs or special projects by colleagues.

Under highly unusual circumstances, faculty may request to be relieved of some teaching responsibilities and, where allowed by the granting agency or sponsor, use their grant support to “buy out” some of their teaching. The value involved will be that stated in the Provostial guidelines “Reimbursement to Home Faculty for Faculty Member Teaching Release, September 2014”. Such buyouts would not normally be for more than 3 units or for periods longer than one year.

For Teaching Stream colleagues, a ratio of 80:20 for teaching to service is preferred, although Chairs may want to consider a small research component. Special and specific projects aimed at improving curricula and courses could, with the Chair’s approval, be considered part of the teaching component.

To encourage the implementation of these principles, the Dean’s Office and the Faculty’s Finance Committee will consider the points outlined above when allocating unit’s annual budgets and new faculty positions. Requests to the Dean’s Office for sessional teaching appointments will also be reviewed in light of the above.
Optimizing Teaching Resources Across the Faculty: Given the breadth of scientific exploration, it is critical that we offer a broad range of programs, programs that encompass both traditional disciplines and more interdisciplinary approaches. We also must use our teaching resources wisely and minimize duplication of content across programs. Eliminating content duplication will have the added benefit of helping student better plan for their postgraduate studies or careers. Students are too often confused about the Level II programs available and where these programs will lead. These efforts, in conjunction with the online McMaster Academic Planner (MAP) and the new course Science 1A03, will help students make better program choices.

Units with many low enrollment programs will be encouraged to contribute to other, larger programs within the Faculty. With the redesign of the Life Science program, it is envisioned that newly developed streams will benefit academically from the contributions of newly designed or even existing courses from non-Life Science units. This will spread the teaching effort across the Faculty and may increase interest in non-Life Science disciplines.

New programs will be evaluated in terms of potential enrollment, especially where new courses are required. The APPC will revise its program review process to require units to provide information on the resource implications of each proposal. This committee will also evaluate all low-enrollment programs with an eye to proposing that persistently low enrollment programs be cancelled or combined with other similar programs. For instance, the current interdisciplinary Origins Institute Research Specialization will be discontinued due to very low enrollments but components of the specialization may form part of a stream within the Life Sciences program. The results of the above efforts should be more focused course offerings that make the best use of our teaching talents while making decision-making clearer for students.

Support for Professional Development and Feedback: The Faculty of Science is home to many highly successful researchers and teachers, and the Faculty should work to develop a system whereby the insights and practices of such experienced colleagues can be passed to other and particularly newly appointed colleagues. Some units have already created their own mentoring programs and the Dean’s Office, in collaboration with Chairs, will work to study the array of current initiatives and prepare a set of guidelines designed to ensure mentoring is broadly available and that mentors have access to instruction and support.

In addition, the Dean’s office and all Chairs will work with colleagues at McMaster Institute for Innovation & Excellence in Teaching & Learning (MIETL) to develop a strong coaching network and process for colleagues to improve their in-class teaching, exam preparation, and other skills.
STEWARD RESOURCES
During the comprehensive review of the Faculty’s activities and with changes in the University’s budgeting mechanism, several areas for administrative improvements came to light. The Dean’s Office will lead efforts in the following areas to ensure the Faculty acts as a responsible steward of its available resources.

Inter-Faculty Teaching: The Faculty is currently presenting a proposal to the Provost’s office to review the rate for which interfaculty teaching is compensated in the new budget model. Given the Faculty’s heavy commitment to interfaculty teaching, an increase in the rate for delivering interfaculty teaching would have significant implications for the Faculty’s ability to renew its complement and achieve its academic priorities. There is absolutely no guarantee that the rate will change and the Faculty must be prepared to work with the budget model as currently formulated. An additional way to manage the costs of interfaculty teaching costs is to alter the delivery of these courses to suit the compensation.

Developing Advancement Opportunities: Increasing revenue through Advancement is clearly important for the long term sustainability of the Faculty of Science. The Dean is committed to spending as much time as possible in this arena. At the same time, Advancement is an area of much confusion, concern and even frustration among colleagues.

The Dean will work with the Chairs and colleagues from Advancement to flesh out very clear regulations and guidelines about all advancement activities within the Faculty to improve communications and understanding among all involved. It will be important to encourage enthusiastic participation in fundraising activity while, at the same time, respecting and remaining compliant with the needs and priorities of McMaster and the Faculty of Science as a whole. It is of the utmost importance that all our activities respect the wishes and sensitivities of existing and potential donors.

The Dean will also work with the Chairs and Advancement to fully develop the nascent Advancement Plan for Science and supportive communications vehicles. Specifically he, with Advancement, will develop new donor-supported sources of research funding and graduate student support. Chairs should work to improve alumni relations at the level of each unit. The Faculty will also look at ways to better understand where our graduates go once they leave the University.

Administrative Responsibilities and the Role of the Dean’s Office: It is essential that the Faculty carry out its administrative responsibilities in the most efficient manner possible to focus our resources on our academic programs. New Chairs will be trained on budget management under the new system. The Mosaic Project, intended to modernize McMaster’s business processes, has generated many changes, and will ultimately lead to improved efficiencies. In collaboration with the Chairs and Administrators of each department, the Faculty’s Director, Finance & Administration will investigate the efficiencies of centralizing some of the unit level financial and HR activities in the Dean’s Office. Where appropriate, different academic units may want to consider sharing staff with similar responsibilities.
Review of Space Utilization: Under activity-based budgeting, the Faculty of Science is charged directly for all space that it occupies; in 2014-2015, the total annual cost is over $9 million. The Dean’s Office will document and review all current space allocations and, in discussion with the units, act to ensure that space is being used effectively. The Dean’s Office will work with individual units to ensure any unused space is removed from the Faculty’s allocation.

International Students and Recruitment in the Faculty: The Dean’s office should also study the number and degree of support for international graduate students across the different programs. International graduate students are often of very high quality and the presence of people from different cultures and backgrounds adds to the quality of the academic experience for undergraduates, graduates and faculty. However, owing to the lack of support for such international students by the provincial government, attracting them is financially difficult and severely limits the number we can accept. The Dean’s office, in particular the Associate Dean (Graduate Studies), will work with SGS to investigate all possible sources of funding for International graduate students. At the same time, the Dean’s Office may need to study and arrange for some limits on the number of Visa students that each unit can support.

Fewer than 4% of our undergraduate students are registered as international students. As described above, encouraging more international students strengthens the student experience by providing for interactions with students from often very different cultures and walks of life. The Dean’s Office will look at ways to attract and support more international undergraduate students.

More generally, the Associate Dean (Academic) and Chairs will review undergraduate recruiting activities across the various units. There is much need to encourage more students to enter the chemical, physical and mathematical sciences, and centralizing these activities in the Dean’s office should serve to maximize return on investment. The Dean’s Office will closely monitor progress on these efforts.
CONCLUSIONS
Our current academic planning has come at a time of much change within the Faculty of Science, McMaster University as a whole, and post-secondary institutions in Ontario and beyond. Many of these changes relate to financial circumstances and, given the financial challenges facing the Provincial Government, it will likely be some time before we see substantial improvements to our basic funding. However, while we face challenges, it is clear that the Faculty of Science has a strong academic base on which to build. Our undergraduate enrollments are strong and our programs are rigorous, innovative and diverse. Our graduate programs are popular and many of our students have gone on to be leaders at other academic institutions, in industry and at government agencies. Our faculty members are deeply involved in leading-edge research programs and have developed strong international reputations.

The Faculty of Science’s Academic Plan should be seen as a means to further develop and exploit our strengths and capture opportunities. Doing so will require that we refocus our resources and some of our activities, and some consolidation will be necessary. We are working from a position of strength and must act to maintain and fortify this status.

The goal is for the Faculty to look back in five years’ time and see that, not only have we weathered the financial challenges, but that we have achieved and exceeded our goals in our undergraduate, graduate and research programs.
Questions and Answers for Students
Regarding the Proposed Closure of the Department of Medical Physics and
Applied Radiation Sciences

Why did the Faculty undertake an Academic Planning Process?
In November 2013, the new Dean of Science, Dr. Robert Baker, struck an Academic Planning Committee (APC). This was done to maintain the Faculty’s reputation for academic excellence and to ensure it continues to improve in a manner that reflects its most fundamental values. The APC was charged with planning for the mid- to long-term future at the Faculty-wide level as well as the individual department/unit-level. Academic planning must be viewed through the context of financial restraint. The University recently adopted a new budget model and Faculties now have a clear understanding of its financial implications. Unfortunately, with an anticipated 2014/2015 deficit of $4.7M, the Faculty of Science is facing some very difficult financial challenges. Left unchecked, this deficit has the potential to create an accumulated debt of $15.4M by 2017. It is clear that the Faculty’s current budget is unsustainable and steps must be taken, and soon, to grow revenue and trim costs.

Over the past months, the APC has familiarized itself with the University and Faculty-wide priorities, was brought up-to-date on the basics of McMaster’s New Budget Model, and the financial issues facing the Faculty. The APC examined extensive data, reviewed and discussed each of the specific department/unit-level academic plans, and then met with Chairs and Directors, as well as student leaders, to discuss both unit-level and Faculty-wide issues. Currently, the APC is developing a draft document that will discuss Faculty-wide priorities, propose overarching strategies and initiatives to help the Faculty achieve its priorities, and wherever possible, identify “next steps”. Student leaders will continue to be consulted as the Plan takes shape and the recommendations become final and are implemented. The Academic Plan, once finalized, will guide directions and resource allocations.

Why is the Department of Medical Physics and Applied Radiation Sciences (MPARS) being recommended for closure (diesestablishment)?
The reorganization of MPARS is in no way a reflection of the quality of the Department. Since its inception in 2005, faculty, students and staff in MPARS have contributed to the high quality teaching and research done in the department. One ‘next step’ already identified by the APC is to disestablish the Department of Medical Physics and Applied Radiation Sciences. This necessary reorganization is being done now because of budget constraints faced by the Faculty and our need to better serve our students. The low enrolment of undergraduate students in the Honors Medical Physics program (32 students across all levels) makes it financially unsustainable without this reorganization.
Who has been consulted in the process and what happens next?
In addition to the broader consultations described above, the following has happened:

- The Dean met with staff and faculty of MPARS on May 23rd.
- Details of the Academic Plan were presented and discussed at the General Faculty meeting on May 29th.
- A draft of the Academic Plan will be released at the end of June.
- Feedback from students, staff and faculty will be collected until mid-August.
- The Academic Planning Committee will reconvene to discuss feedback, consider further consultation and release a Final Plan, with managerial recommendations being implemented right away. For other recommendations, working groups will be struck to oversee implementation.

When will this disestablishment happen?
We expect that the disestablishment of MPARS would take effect in July 2015. A committee will be formed to discuss the proposal to disestablish MPARS. That proposal then will be moved through all the normal governance procedures.

What does this mean for the students? What is happening to current program offerings?
Honours B.Sc. in Medical Physics
Despite the proposed closure of the Department of Medical Physics and Applied Radiation Science, the Faculty remains committed to continuing the Honours Medical Physics program until all current students have graduated, and therefore, closure should not have any serious negative consequences on the opportunity for current registrants to complete their degree. Course offerings are not expected to change, allowing students to complete their program requirements, as stated in the Undergraduate Calendar. A working group will be struck to rethink how a Medical Physics program can contribute to the undergraduate experience at McMaster and how this discipline can be offered at the undergraduate level.

Mohawk-McMaster Medical Radiation Sciences Program
The Faculty will continue to offer its highly regarded Medical Radiation Sciences programs, and therefore, this decision will not have any academic consequences on any current or future registrants. Students will complete their program and degree requirements, according to the requirements stated in the Undergraduate Calendar. This change will not affect the accreditation of the Medical Radiation Sciences programs.

Graduate Education
The current Masters and Ph.D. programs including the M.Sc. in Health and Radiation Physics, M.Sc. in Radiation Sciences (Medical Physics), M.Sc. in Radiation Sciences (Radiation Biology), M.Sc. in Radiation Sciences (Medical Radiation Science), and the Ph.D. in Radiation Sciences in both the fields of Medical Physics and Radiation Biology will continue to be offered, as they currently exist.
How will the current and future programs be administered?

Undergraduate education
For at least the next year, the Departmental Office of Medical Physics and Applied Radiation Sciences (GS/105) will continue to administer the Honours Medical Physics programs as well as the Medical Radiation Sciences programs. The staff and Academic Advisors in the Office of the Associate Dean (Academic) are available to provide advice and assistance.

Beyond this, administration of these and any future programs will be moved to a proposed new academic unit that will serve as the administrative home for these and other existing undergraduate programs, including Life Sciences and Integrated Science (iSci).

Graduate education
For the upcoming year, the administration of the graduate program will be based in the Office of the Department of Medical Physics and Applied Radiation Sciences as it is now. In future years, the administration of the graduate programs will follow the general model of interdisciplinary graduate programs within the Faculty. As details are known, students will be told about any changes.

Will any Faculty be let go? Who will teach the existing course offerings?
Current faculty members in MPARS will have their appointments transferred to other departments within the Faculty of Science, based on their research needs, and areas of expertise and teaching. There is no expectation that the nature (or physical space) of current faculty members’ research programs will change because of the disestablishment of MPARS. This will allow the close integration of research and teaching, a hallmark of McMaster, to continue. Course offerings are not expected to change, allowing students to complete their program requirements, as stated in the Undergraduate Calendar.

Where will undergraduate students go for academic advising?
As always, the staff and Academic Advisors, in the Office of the Associate Dean (Academic) are available to offer advice and assistance to students. Additionally, Undergraduate Associate Chairs will continue to be available to assist students with specific courses and/or program-related questions or concerns.

What will happen to the staff?
At present, for the next year, no layoffs are planned and we aim to minimize any future layoffs. We are proposing to create a new unit to house the existing programs. It may be possible for staff to be reassigned to that or other units within the Faculty.