McMaster University

SENATE MINUTES

Wednesday, February 10, 2016 at 3:30 p.m.
In the Council Room (111), Gilmour Hall

PRESENT: Dr. Patrick Deane (Chair), Ms Leah Allan, Dr. Vishwanath Baba, Dr. Robert Baker, Dr. Lee Beach, Dr. Patrick Bennett, Dr. Mark Boda, Dr. Narat Charupat, Mr. Ken Clarke, Dr. Ken Cruikshank, Dr. Tim Davidson, Dr. James Dunn, Mr. Daniel Elbirt, Dr. Carlos Filipe, Mr. Peter Gardhouse, Dr. Don Goellnicht, Dr. Elzbieta Grodek, Mr. Mitchell Hajnal, Dr. Sheila Harms, Dr. Janice Hladki, Dr. Shafiqul Huque, Dr. Jerry Hurley, Ms Rebecca Jamieson, Ms Varda Khan, Dr. Ivona Kúčerová, Dr. Colleen McKey, Dr. Patricia McNiven, 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, Dr. Lehana Thabane, Mr. Philip Tominac, Ms Veronica van der Vliet, Dr. Matt Valeriote, Dr. Brenda Vrkljan, Dr. Doug Welch, Dr. David Wilkinson, Ms Mary Williams, Dr. J.P. Xu, Ms Helen Ayre (Secretary of the Senate), Susan Welstead (Assistant University Secretary)

OBERVERS: Dr. Ken Coley, Ms Esme Davies, Dr. Susan Denburg, Dr. Michelle Dion, Ms Andrea Farquhar, Dr. Jacy Lee, Dr. Anna Moro, Mr. Ehima Osazuwa, Ms Karen Richmond, Mr. Sean Van Koughnett, Dr. Jean Wilson

REGRETS RECEIVED: Mr. Jacob Bailey, Mr. Ian Cowan, Dr. Alison Holloway, Dr. Suzanne Labarge, Ms Vivian Lewis, Dr. Paul McNicholas, Prof. Bridget O’Shaughnessy, Ms Melissa Pool, Ms Moira Taylor, Mr. Peter Tice, Dr. Leonard Waverman

A. OPEN SESSION

OPENING REMARKS

Dr. Deane made some comments on current events that are attached as Appendix A.

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 February 10, 2016, and that item II 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 January 13, 2016 be approved as circulated

Approved by Consent

REGULAR

III BUSINESS ARISING

a. Committee on Academic Integrity (Appendix B)

i. Proposed Revisions to the Academic Integrity Policy

Dr. Thabane reminded Senators that when proposed revisions to the Academic Integrity Policy came to the January meeting, there was some discussion of the wording of clauses 3 and 26, and it was decided that the Committee on Academic Integrity should propose the clarifications. The revised policy was now back before Senate for approval. As noted at the January meeting, the bulk of the revisions were intended to bring the Academic Integrity Policy into alignment with the Research Integrity Policy. Other changes included: a provision for a general transcript notation with an “end-date,” at which time it would automatically be removed; a process for removing a letter related to academic dishonesty from a graduate student’s academic file; a sample list of unauthorized aids; and an option whereby a student could submit penalty suggestions to a Faculty Adjudicator in the event of a finding of academic dishonesty.

It was duly moved and seconded,

“that the Senate approve revisions to the Academic Integrity Policy as set out in Appendix B.”

The motion was carried.

IV ENQUIRIES

There were no enquiries.
V COMMUNICATIONS

There had been no communications to the Senate since the last meeting that were not dealt with elsewhere on the agenda.

VI REPORTS FROM COUNCILS

a. Graduate Council (Appendix C)
   i. Proposal to Establish a PhD Program in Communication, New Media and Cultural Studies

Dr. Welch explained that Graduate Council was recommending approval of a new interdisciplinary PhD program be offered by the Departments of English and Cultural Studies and Communication Studies and Multimedia, commencing in September 2017. The proposal brought together expertise from both Departments to offer a doctoral program for students interested in communication, representation, cultural production and critical literacy in the context of social responsibility. The proposal for the new program had been reviewed and approved by the University Planning Committee.

It was duly moved and seconded,

"that the Senate approve the establishment of the PhD Program in Communication, New Media and Cultural Studies, to commence in September 2017, as set out in Appendix C."

The motion was carried.

ii. Proposed Change to the Admission Requirements for the MA in Sociology

Dr. Welch further reported that Graduate Council had approved a proposal from the Department of Sociology to change the admission requirements for the MA in Sociology to open admission to students from other Social Sciences disciplines.

It was duly moved and seconded,

"that the Senate approve the recommendation of Graduate Council that, effective September 2016, admission to the MA in Sociology be open to students from other Social Sciences disciplines."

The motion was carried.

iii. Change to Course Requirements for the PhD in Anthropology

iv. Change to Specialization Name for the PhD in Anthropology
v. Change to Name of Research Area and Addition of Comprehensive Examination Area for the PhD in Sociology
vi. Revision to Calendar Copy for the PhD in Sociology

Senate received the above-listed reports for information.

b. Undergraduate Council (Appendix D)

i. Proposal to Establish an Integrated Biomedical Engineering and Health Sciences Plus Program

Dr. Searls Giroux explained that Undergraduate Council was recommending the establishment of an innovative and collaborative program to be offered by the Faculties of Engineering and Health Sciences. The direct-entry program would consist of a common first year, after which students would choose one of two degree pathways leading to either a five-year Honours Bachelor of Health Sciences in Health, Engineering and Entrepreneurship or a five-year Bachelor of Engineering in Engineering and Biomedical Engineering.

The Biomedical Engineering specialization would combine the requirements of one of the traditional engineering discipline streams offered by the School of Engineering and Applied Sciences (chemical, civil, electrical and computer, engineering physics, materials science, mechanical, mechatronics, and software) with requirements specific to the IBEHS+ Program. Each degree pathway would also include a co-op option.

It was duly moved and seconded,

"that the Senate approve the establishment of an Integrated Biomedical Engineering and Health Sciences Plus program leading to one of two degree pathways, Honours Bachelor of Health Sciences in Health, Engineering and Entrepreneurship or Bachelor of Engineering and Biomedical Engineering in Engineering and Biomedical Engineering, and the corresponding co-op programs, Engineering and Biomedical Engineering Co-op and Health, Engineering and Entrepreneurship Co-op, for inclusion in the 2017-18 Undergraduate Calendar, as outlined in Appendix D."

A member asked if the program would become six years long if a student opted for a co-op version. Dr. Coley replied that it would not -- the summer terms would be the work terms in the co-op options.

The motion was then voted on and carried.

ii. Curriculum Revisions for Inclusion in the 2016-17 Undergraduate Calendar

Senate received this report for information.
VII REPORTS FROM SENATE COMMITTEES

a. University Planning Committee (Appendix E)

i. Proposal to Establish the Centre for Advanced Research in Experimental and Applied Linguistics

Dr. Wilkinson explained that the University Planning Committee had approved a proposal from the Faculty of Humanities to establish a Centre for Advanced Research in Experimental and Applied Linguistics. The new centre, to be based in the Department of Linguistics and Languages, would focus on the understanding of language, cognition and brain function as a single, complex and integrated system enabling human comprehension and communication. The centre would foster collaboration among researchers across theoretical and applied disciplines and would enhance the University’s profile as a hub for innovative interdisciplinary research.

It was duly moved and seconded,

“that the Senate approve, for recommendation to the Board of Governors, the establishment of the Centre for Advanced Research in Experimental and Applied Linguistics as set out in Appendix E.”

The motion was carried.

ii. Proposal to Establish a PhD Program in Communication, New Media and Cultural Studies

Dr. Wilkinson 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 Graduate Council (agenda item VI.a.i, above).

iii. Proposal to Establish an Integrated Biomedical Engineering and Health Sciences Plus Program

Dr. Wilkinson 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 VI.b.i, above).

b. Committee on Appointments (Appendix F)

i. Proposed Terms of Reference for Director and Associate Directors of the Walter G. Booth School of Engineering Practice and Technology

Dr. Vrkljan explained that, as part of the closure of the Schools of Engineering Technology and Engineering Practice and the establishment of the new School of Engineering Practice and Technology, the Faculty of Engineering had developed terms of reference for the
Director and three Associate Directors of the new school. The Committee on Appointments reviewed and approved these terms and now recommended them to Senate.

It was duly moved and seconded,

"that the Senate approve, for recommendation to the Board of Governors, terms of reference for a Director and three Associate Directors of the proposed School of Engineering and Technology, as set out in Attachment I of Appendix F."

The motion was carried.

ii. Proposal to Establish the Frederick Hargreave / Teva Innovation Chair in Airway Diseases

Dr. Vrkljan explained that, on recommendation of the Faculty of Health Sciences, the Committee on Appointments was proposing the establishment of the Frederick Hargreave / Teva Innovation Chair in Airway Diseases as an endowed Chair to be funded by Teva Branded Pharmaceutical Products, Inc., and the Department of Medicine. The chair was being established in honour of the late Dr. Frederick Hargreave.

It was duly moved and seconded,

"that the Senate approve, for recommendation to the Board of Governors, the establishment of the Frederick Hargreave / Teva Innovation Chair in Airway Diseases, with terms of reference as set out in Attachment II of Appendix F."

The motion was carried.

VIII 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 January 13, 2016;

b. approved, on recommendation of the Executive Committee, nominations to fill vacancies on the Committee on Appointments, the Board-Senate Research Misconduct Hearings Panel, and the Board-Senate Hearing Panel for Sexual Harassment and Anti-Discrimination;

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

- a Chair of the Department of Civil Engineering for a five-year term, effective July
1, 2016;
• a Chair of the Department of Computing and Software for a five-year term, effective July 1, 2016;
• the Program Chair of the Civil Engineering Infrastructure Technology Program, School of Engineering Technology, for the period September 1, 2016 to August 31, 2019;
• the Director of the Chemical Biology Graduate Program for a five-year term, effective July 1, 2016;
• Directors of the Radiation Sciences and Health and Radiation Physics Interdisciplinary Graduate Programs, one for the period January 1 to June 30, 2016 and one for a five-year term, effective July 1, 2016;
• the Acting Director of the School of Engineering Technology for the period November 9, 2015 to April 9, 2016;
• the AbbVie Chair in Education in Rheumatology for a five-year term, effective July 1, 2016;
• the Arnold L. Johnson Chair in Health Care Ethics for a five-year term, effective July 1, 2016;
• a Frederick Hargreave / Teva Innovation Chair in Airway Diseases for the period July 1, 2016 to June 30, 2020; and
• an Ontario Research Chair in Educational Achievement and At-Risk Students for a seven-year term, effective July 1, 2016;

d. nominated, on recommendation of the Committee on Appointments, through the President to the Board of Governors, an Associate Professor with tenure in the Department of Sociology, effective July 1, 2016;

e. received from the Committee on Appointments decisions made with respect to recommendations for promotion to Professor and to Associate Professor from the six Faculties, and nominated, through the President to the Board of Governors, those candidates for whom promotion had been approved by the Appointments Committee;

f. received from the Committee on Appointments, for information, reports on the following appointment decisions:

• an Acting Chair of the Department of Civil Engineering for the period January 1 to February 29, 2016;
• an extension of the appointment of the Director of the M.Sc. in Health Science Education Program until June 30, 2018;
• an extension of the appointment of the Associate Director of the M.Sc. in Health Science Education Program until December 31, 2017;
• an Associate Chair (Research) for the Department of Oncology for the period July 1, 2016 to June 30, 2019;
• an Associate Chair (Education) for the Department of Oncology for the period July 1, 2016 to June 30, 2019;
• an Associate Chair (Undergraduate) for the Department of Materials Science and Engineering for the period January 1, 2016 to December 31, 2017; and
• an Associate Chair (Undergraduate) for the Department of Physics and Astronomy for the period July 1, 2015 to June 30, 2016;

g. appointed two scrutineers to oversee the counting of ballots for the Faculty elections to Senate;

h. received from the Board for Student Appeals, for information, reports on two recent student appeals; and

i. approved a request for early graduation.
NOTES - OPENING REMARKS TO SENATE - FEBRUARY 10, 2016

Canada First Research Excellence Fund Letter of Intent - McMaster’s LOI was accepted and we have been invited to submit a full proposal, which must be submitted by March 29, 2016. The proposal is titled “Integrated Molecular Population Science: A New Frontier in Evidence-Based Medicine,” and the team is being led by Gerry Wright and Salim Yusuf. There were 51 submissions at the LOI stage, which have now been reduced to 30 full proposals following a detailed review process. Total funding of $900M is available in this second competition; collectively, the 30 LOI proposals represent a total Fund request of almost $2.4 billion.

McMaster Ottawa Day - McMaster representatives were in Ottawa last week seeking to establish positive relationships with members of the new federal government.

Employment Equity - As Senators will have seen, the employment equity census has now been launched. Everyone is encouraged to participate; employment equity is an area of focus for the coming year (and beyond), and the census, which consists of six questions, is an important first step to understanding the composition of the University’s workforce.

IT Services Review - As many Senators will know, the University has recently begun a wide-ranging review of IT services and delivery across the institution. This review is being project managed by Kathy Denney (formerly Director of Administration, Faculty of Business), sponsored by the Provost and Vice-President (Administration), and involves a team of internal and external reviewers. Its mission is to ensure that McMaster has the most effective and efficient IT services to meet the University’s teaching, research and operational needs in the coming years. Over the next few months, the review team will be compiling data on the current IT Services landscape and soliciting feedback from the entire McMaster community via interviews, online surveys and forums. Based on this information, the Committee will then develop recommendations with a final report to be issued this fall. All Senators (and everyone else) are encouraged to participate and provide comments, suggestions and feedback.

Key Initiatives -

a) Research Showcase - The “Building Healthy Communities” research showcase is currently underway and features a variety of events including public talks and workshops, a Health Crawl, Health Fair and an event taking place this evening (February 10) in partnership with the Walrus Foundation (including our own Gerry Wright and Jennifer Heisz). The final showcase, “Climate Change and Environment: Navigating from Risk to Resilience,” runs April 18-22, 2016, and includes a day-long event to explore the challenges cities are facing due to climate change, as well as considering the opportunities this presents and seeking resilient solutions.

Many thanks to everyone involved in developing and running the Showcase series, which had as its goal highlighting and celebrating McMaster research and researchers, demonstrating the practical solutions to local and global issues that universities can help to develop, and building positive relationships within the broader community.

b) McMaster Seminar Series - Thanks also to everyone who attended the successful Naomi Klein lecture on February 4, “This Changes Everything.” The final lecture in the 2015-16 series will
take place during the afternoon of Thursday, March 31 and will feature Arlette Zinck speaking about “The Engaged University and the Responsibility of its Educators.” All are welcome and encouraged to attend. Planning is beginning for the 2016-17 series; Senators are invited to let us know (at president@mcmaster.ca) of any speakers they’d suggest or would like to see invited to the University, still continuing with “The Engaged University” theme.

c) Perspectives on Peace - As mentioned at the last meeting, a range of PoP events took place during January. The next Laureates of Peace lecture will take place on Tuesday, February 23 (3:30 p.m.) in Convocation Hall and will be given by Marc Kielburger of Free the Children. This leads up to the McMaster Model United Nations conference which will take place February 26-28 and will be attended by more than 150 McMaster student delegates. All the various events will be publicized on the Daily News and full details are available on the Perspectives on Peace website as well.
Revisions to Academic Integrity Policy

At its meeting on January 13, 2016, Senate reviewed proposed revisions to the Academic Integrity Policy. The Policy was referred back to the Committee on Academic Integrity to provide clarification to Sections 3 and 26 of the Policy. The Committee on Academic Integrity approved the revisions by e-mail vote on February 1-2, 2016.

The Committee on Academic Integrity now recommends,

that Senate approves the revisions to the Academic Integrity Policy as set out in the attached.

Senate: February 10, 2016
Complete Policy Title: Academic Integrity Policy

Approved by: Senate

Date of Original Approval(s): March 13, 2002

Responsible Executive: Academic Integrity Officer

Policy Number (if applicable):

Date of Most Recent Approval: April 10, 2013 (effective July 1, 2013)

Supersedes/Amends Policy dated: March 14, 2012

Enquiries: University Secretariat

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PREAMBLE

1. The main purpose of a university is to encourage and facilitate the pursuit of knowledge and scholarship. The attainment of this purpose requires the individual integrity of all members of the University community, including all graduate and undergraduate students. Scholars at McMaster demonstrate integrity in many ways, including the following:

- Scholars practice intellectual honesty in the process of acquiring and extending knowledge. They do this by improving scholarly competence, and by exercising critical thinking and self-discipline.

- Scholars show respect for and courtesy to others in free discussions on academic topics and recognize the right to free inquiry and opinion.

- Scholars adhere to ethical requirements in their research.

- Scholars acknowledge fully the work of others by providing appropriate references in papers, essays and the like and declaring the contributions of co-workers. Scholars do not take credit that is not earned.

- Scholars strive to ensure that others are not put at a disadvantage in their pursuit of knowledge. They do not withhold material that should rightly be available to all.

The University states unequivocally that it demands scholarly integrity from all of its members. Academic dishonesty, in whatever form, is ultimately destructive to the values of the University, furthermore, it is unfair and discouraging to those students who pursue their studies honestly.

2. This Policy applies to all registered students, to students who have withdrawn or graduated if it is alleged that they committed academic dishonesty during the time they were registered students or in order to obtain admission or registration, and to students who have withdrawn from the University but who submit work for academic evaluation for the purpose of gaining readmission.

RELATED POLICIES

3. This document is to be read in conjunction with the following University policies and statements:

a) Research Integrity Policy Ethics at McMaster University
Cases of alleged research misconduct (as defined in the policy “Research Ethics at McMaster University”) that involve funded research a student is doing outside of course work as part of his or her academic program shall normally be governed by the procedures contained in the “Academic Research Integrity Policy”.

b) Student Code of Conduct
The Student Code of Conduct governs the non-academic behaviour of students, whereas this Policy governs academic behaviour. In some instances, a student’s behaviour may involve both academic and non-academic issues, in which case the student may, at the
discretion of the instructor or administrator involved, be subject to the procedures of either or both policies.

RESPONSIBILITIES

All Members of the University Community

4. All members of the University community (students, faculty, instructors, staff and invigilators) have responsibility for the maintenance of an atmosphere of academic integrity in all phases of academic life, including research, teaching, learning and administration.

5. All members of the University have the responsibility to:

   a) detect and report incidents of academic dishonesty, falsification of documents, etc., and
   b) provide assistance and co-operation in the prosecution of alleged offenders.

Office of Academic Integrity

6. The purpose of this office is to assist instructors, students and staff with issues of academic integrity. Responsibilities include:

   a) planning and coordinating academic integrity education and academic dishonesty prevention activities,
   b) assisting with instructor education and developing programs concerning integrity issues by serving as a resource and providing educational materials,
   c) providing advice to instructors, students, Faculties, the Office of the Registrar and so on with respect to individual case investigation, documentation and presentation,
   d) providing procedural advice to and administrative support for Faculty Adjudicators in the hearing of academic dishonesty charges,
   e) acting as a resource for Faculty Adjudicators with respect to sentencing practices and student history of dishonesty,
   f) storing all documentation on academic dishonesty cases that take place at the instructor and Faculty levels and providing an annual written report to the University Senate on activities and dishonesty cases on behalf of all Faculties,
   g) tracking complaints and making inquiries about suspected incidents of academic dishonesty that have not been pursued, and
   h) recommending to Senate, from time to time, guidelines with respect to appropriate sanctions for certain offences, such guidelines to be affixed to this Policy as Appendix 4.

Administration

7. The term “Administration”, as used in this Policy, refers to individuals and entities responsible for the University’s academic programs. They include: Department Chairs, Directors of Schools and Programs, Associate and Assistant Deans, Deans, the Associate Vice-President (Academic), the Provost, and the Senate. Administrators are responsible for developing and updating policies and procedures related to maintaining the academic integrity of the University community. In addition,
they are responsible for providing resources so that members of the University are able to function with integrity in their academic pursuits. These resources may include:

a) disseminating information about the expectations for academic integrity,
b) developing, or assisting instructors to develop, guidelines to be used by instructors in preparing course outlines that clearly articulate expectations,
c) providing testing environments, examination protocols (e.g., seating plans) and expectations for the review of examinations to make the opportunity for academic dishonesty more difficult, and

d) providing the resources to support an Office of Academic Integrity.

Office of the Registrar

8. The Office of the Registrar is responsible for developing policies and procedures to detect misrepresentation of credentials during the admissions process and to maintain academic integrity during the writing of Registrar-administered examinations. For graduate students, the Graduate Registrar of the School of Graduate Studies has the same responsibilities regarding the admissions process.

Faculty Adjudicators (see also Appendix 1)

9. Faculty Adjudicators are responsible for adjudicating allegations of academic dishonesty, including making sure that the case is heard in a timely manner, the penalty is appropriate for the circumstances and in the light of previous precedents and practice, and the results are communicated to all the relevant parties.

Instructors

10. Instructors are responsible for using educational strategies that encourage students to behave honestly. These may include:

a) clearly articulating expectations about appropriate academic behavior at the beginning of the course,
b) developing course outlines that clearly set out expectations for referencing sources of information, for group work and so on,
c) using mechanisms during testing that reduce or eliminate the opportunities for copying, e.g., test facilities and randomized seating,
d) regularly producing new tests/examinations, especially for deferred examinations,
e) producing new assignments (such as laboratories and essay and report topics) on a regular basis to discourage copying from previous years’ assignments, and
f) asking students to sign declarations that the work submitted is their own as a reminder of the necessity for academic integrity and the consequences of academic dishonesty.
Students (Undergraduate and Graduate)

11. Students are responsible for being aware of and demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:

   a) following the expectations articulated by instructors for referencing sources of information and for group work,
   b) asking for clarification of expectations as necessary,
   c) identifying testing situations that may allow copying,
   d) preventing their work from being used by others, e.g., protecting access to computer files, and
   e) adhering to the principles of academic integrity when conducting and reporting research.

12. Students are responsible for their behaviour and may face penalties under this Policy, if they commit academic dishonesty.

Graduate Students

13. Graduate students, having been deemed admissible to higher studies, are expected to be competent in the acknowledgement of other peoples’ work, whether that work is in print or electronic media.

14. Graduate education concentrates on the formation of appropriate research skills and prepares students to undertake independent inquiry. All graduate students are responsible for familiarizing themselves with the definitions of research integrity and research misconduct in the University policies. Graduate students are expected to understand the demands of ethical conduct of research and reporting research results. All graduate students are responsible for familiarizing themselves with the definition of research misconduct in the University’s policy; namely, “a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities.”

Committee on Academic Integrity

15. The Committee on Academic Integrity is responsible for making recommendations to the Senate on policy and procedures relating to issues of academic integrity and on measures designed to reduce instances of academic dishonesty. Additionally, the committee reviews the annual report prepared by the Office of Academic Integrity prior to its presentation to the Senate.

ACADEMIC WORK

16. Academic work includes any academic paper, term test, proficiency test, essay, thesis, research report, evaluation, project, assignment or examination, whether oral, in writing, in other media or
otherwise and/or registration and participation in any course, program, seminar, workshop, conference or symposium offered by the University.¹

For graduate students, comprehensive/qualifying exams, any research work relating to a course, and thesis work (a thesis proposal, or thesis draft, or draft of one or more chapters) also constitute academic work and must adhere to standards of academic integrity.

ACADEMIC DISHONESTY

Definition

17. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage.

Wherever in this Policy an offence is described as depending on "knowingly", the offence is deemed to have been committed if the person ought reasonably to have known.

ACADEMIC DISHONESTY OFFENCES

18. The following is a list of examples of academic dishonesty. It is not meant to be exhaustive. For fuller explanations of academic dishonesty, please refer to Appendix 3.

It shall be an offence knowingly to:

a) plagiarize, i.e. submit academic work that has been, entirely or in part, copied from or written by another person without proper acknowledgement, or, for which previous credit has been obtained (see Appendix 3),
b) submit the same academic work to more than one course (see Appendix 3),
c) submit academic work for assessment that was purchased or acquired from another source,
d) collaborate improperly on academic work (see Appendix 3),
e) aid or abet another student's academic dishonesty,
f) copy or use unauthorized aids (e.g., cheat sheets, cell phones, etc.) in tests, examinations or laboratory reports,
g) procure, distribute or receive an examination, test or course materials that are in preparation or storage for an academic assessment,
h) remove, without authorization, academic work (e.g. previous assignments or laboratories) submitted by other students to the instructor,
i) alter a grade on academic work after it has been marked and using the altered materials to have the recorded grade changed,
j) steal, destroy or tamper with another student's academic work,
k) prevent another student(s) from completing a task for academic assessment,

¹ The University of Toronto has a similar definition of academic work which it has shared with McMaster University for use in this policy.
fail to take reasonable precautions to protect academic work such as assignments, projects, laboratory reports or examinations from being used by other students,

misrepresent academic credentials from other institutions or submit false information for the purpose of gaining admission or credits,

submit false information or false medical documentation to gain a postponement or advantage for any academic work, e.g., a test or an examination,

forge, alter or fabricate McMaster University documents,

forge, alter or fabricate transcripts, letters of reference or other official documents,

impersonate another student either in person or electronically for the purpose of academic assessment,

provide a false signature for attendance at any class or assessment procedure or on any document related to the submission of material where the signature is used as proof of authenticity or participation in the academic assessment, and,

commit research misconduct (see Appendix 3), which shall include:

i) the misrepresentation, fabrication or falsification of research data,

ii) the abuse of confidentiality with regard to information and ideas taken from manuscripts, grant applications or discussions held in confidence,

iii) other kinds of misconduct, such as: the violation of the regulations of the granting bodies; the improper use of funds, equipment, supplies, facilities, or other resources; the failure to respect University policies on the use of human subjects or animals.

PROCEDURES IN CASES OF ACADEMIC DISHONESTY

The Person Responsible for Bringing a Charge (The University Representative as identified in Sections 19-21)

19. a) The primary responsibility for bringing a charge of academic dishonesty involving academic work submitted for credit in a course rests with the instructor of the course.

Examples:

i. In the case of a take-home assignment (paper, essay, book review, etc.) the marker must bring the suspicion of academic dishonesty to the attention of the instructor.

ii. In an in-class test or examination, the invigilator must bring the suspicion of academic dishonesty to the attention of the instructor.

iii. In a University-administered examination, the invigilator must report his or her suspicion that academic dishonesty may have occurred to the Chief Presider. The Chief Presider shall give a full report, together with any confiscated material, to the Associate Registrar (Examinations and Schedules), who shall report the matter to the instructor.

b) The primary responsibility for bringing a charge against a graduate student suspected of academic dishonesty in a Master's project, thesis work or a thesis rests with the student's supervisor.
c) The primary responsibility for bringing a charge against a graduate student suspected of academic dishonesty in a comprehensive examination rests with the member(s) of the examining committee who detect(s) it.

d) The primary responsibility for bringing a charge against a graduate student suspected of research misconduct (as defined in the policy "Research Ethics at McMaster University") not included in any of the previous categories rests with the student's supervisor.

e) The primary responsibility for bringing a charge against a student suspected of falsifying and/or using falsified documents (e.g. transcripts, letters of reference, medical documentation) rests with the appropriate University Officer (e.g., the Registrar, the Graduate Registrar, an Associate Dean, etc.).

f) The primary responsibility for bringing a charge against a student suspected of academic dishonesty, of a nature that does not clearly fall within the preceding sections, shall rest with the appropriate instructor or University Officer. For example, if a student steals and/or is found to be in possession of stolen examination copy, the primary responsibility rests with the instructor responsible for the course.

20. When the person who bears the primary responsibility fails to bring a charge within a reasonable time, the Department Chair or School/Program Director may bring a charge. If the Chair or Director does not bring a charge within a reasonable time, then the appropriate Associate Dean (as identified by the Office of Academic Integrity) may do so.

21. Any person who believes that a student has committed academic dishonesty, including research misconduct, may submit a signed statement, including all relevant evidence, to the appropriate Associate Dean (as identified by the Office of Academic Integrity). The Associate Dean will conduct an investigation and, if appropriate, bring a charge.

Contacting the Student

22. The University Representative shall:

a) notify the student of the nature of the charge of academic dishonesty, the evidence against him/her, and the procedures to be followed,

b) provide the student a fair opportunity to answer the charge within two weeks after contacting the student, and

c) if the charge relates to a course in which the student is registered, inform the student, the Registrar, and the student's Associate Dean that, while under investigation for academic dishonesty, the student shall not be permitted to withdraw from the course concerned (see Section 39).

Determining that an Offence has been Committed

23. The University Representative shall determine, based on his/her discussion with the student and a review of all relevant evidence, whether an offence has been committed.

24. When the University Representative determines that there are no grounds for a charge or there is insufficient evidence with which to proceed, he/she shall so inform the student in writing (with a
copy to the Registrar and the student's Associate Dean, if they were informed under the terms of Section 22 (c) within 10 working days of his/her meeting with the student. This does not preclude a University Representative from bringing a charge at a later date, should new evidence become available.

Checking for Previous Offences

25. When the University Representative determines that an offence has taken place, and before deciding on a penalty, he/she shall check with the Office of Academic Integrity to determine if it is a first offence.

Instructor-Imposed Penalties for First Offences

26. In the case of undergraduate students, if there is no previous offence on record and none of the conditions in Clause 27 apply, an instructor can impose penalties of:

a) a reduction of the mark on the piece of academic work, or
b) a mark of zero for the piece of academic work, or
c) if the piece of academic work is worth less than 5% of the course grade, a course grade reduction of up to 5%.

The instructor shall notify the student, in writing, of the penalty and of the student's right of appeal to the Faculty Adjudicator (through the Office of Academic Integrity) generally within 20 working days after the instructor first contacts the student with a suspicion of academic dishonesty. The instructor shall also report the penalty, and a brief description of the case, to the Office of Academic Integrity and the student's Associate Dean. A penalty levied by an instructor takes place immediately and shall not be stayed by an appeal.

For graduate students, see Clause 27 below

Referral of First Offences

27. The University Representative also shall refer a case to the Office of Academic Integrity, if:

a) he/she believes a penalty greater than zero for the piece of work concerned is warranted,
b) there are multiple charges against the student,
c) the student is a graduate student, and/or
d) the alleged offence does not relate to the work in a course (e.g., presentation of falsified documents).

When a University Representative refers a case to the Office of Academic Integrity, she/he shall inform the student, the student's Associate Dean and the Registrar.
The Office of Academic Integrity will inform the appropriate Faculty Adjudicator and commence the procedures described in Sections 29 to 38 below.

Referral of Second or Subsequent Offences

28. If there is a previous offence on record, the University Representative shall refer the case to the Office of Academic Integrity and so inform the student, the student's Associate Dean and the Registrar. The Office of Academic Integrity will inform the appropriate Faculty Adjudicator and commence the procedures described in Sections 29 to 38 below.

Adjudication Without a Hearing

29. If the student charged with academic dishonesty admits guilt and the University representative, the student and the Faculty Adjudicator are all in agreement that a Hearing is not required to determine the penalty, the Faculty Adjudicator may make a decision regarding the penalty based on the written submissions of the complainant and the student.

Hearing by Faculty Adjudicator

30. In other cases referred to the Faculty Adjudicator, a Hearing shall be held in accordance with the procedures set out in Appendix 2. The Hearing shall normally be held no later than one month after the date the Office of Academic Integrity receives the case. At the Hearing, it shall be the responsibility of the University Representative to provide evidence to the Faculty Adjudicator that the student committed academic dishonesty. Decisions of the Faculty Adjudicator with respect to the student's guilt or innocence shall be based on a preponderance of evidence, meaning the evidence shows it is more likely than not that the student committed academic dishonesty.

31. Only after the Faculty Adjudicator has determined that academic dishonesty has been committed, and before deciding on a penalty, shall he/she inquire of the Office of Academic Integrity whether there is a record of a previous offence in the student's file.

32. If the Hearing is for an appeal by a student of the decision of an instructor that the student committed academic dishonesty and/or of the penalty imposed by the instructor, it shall be the responsibility of the instructor to provide evidence of the student's guilt and of the appropriateness of the penalty.

33. The Faculty Adjudicator may take the following action:

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2 Unless otherwise specified, the appropriate Faculty Adjudicator shall be;

a) in cases involving academic work submitted for credit in a course by an undergraduate student, the Faculty Adjudicator for the Faculty that received the academic work for assessment,

b) in all other cases involving undergraduate students, the Faculty Adjudicator of the Faculty in which the student was last registered,

c) for courses in interdisciplinary units or for students registered in programs that are not under the jurisdiction of a Faculty, a Faculty Adjudicator assigned by the Office of Academic Integrity, and

d) in all cases involving graduate students, the Faculty Adjudicator for the School of Graduate Studies.
a) dismiss the case, or
b) make a finding of academic dishonesty and impose one or more penalties as described in Section 34 below.

Penalties

34. The following penalties may be imposed by the Faculty Adjudicator upon any student found to have committed academic dishonesty. Repeated and/or multiple violations will increase the severity of the penalty. Academic dishonesty committed by graduate students will have more serious consequences than that committed by undergraduate students. When there is a finding of academic dishonesty relating to a course, the student shall not be permitted to withdraw from the course in question. Penalties may be used independently or in combination for any single violation. Penalties include:

a) a letter reporting the academic dishonesty offence, sent to the student and copied to the Office of Academic Integrity, the student’s Associate Dean, the Registrar and/or the Graduate Registrar,
b) a reduction of the mark on the piece(s) of academic work,
c) a mark of zero for the piece(s) of academic work,
d) a reduction of the course grade,
e) zero for the course with a transcript notation as provided in Section 475,
f) denial of permission to use facilities of the University, including computer facilities and laboratories, for a designated period of time,
g) denial of permission to register,
h) cancellation of registration,
i) suspension, i.e., the withdrawal by the University of all academic privileges for a specified period of time, after which the student is eligible to return,
j) expulsion, i.e., the withdrawal by the University of all academic privileges for an indefinite period of time,
k) a recommendation to Senate to rescind the student’s degree, and
l) a transcript notation as provided in Section 46,
m) such other penalties as may be appropriate in the circumstances.

For graduate students all of the above penalties may be assessed in addition to:

m) a letter reporting the academic dishonesty offence to be placed in the student’s academic file at the School of Graduate Studies and in the student’s program/department file,

n) the grade of Unsatisfactory assigned on a supervisory committee meeting report.

Suspension and expulsion entail transcript notations as described in Sections 48 and 49. 46 and 47. Prohibiting a student from registering for a specified period of time does not entail a transcript notation.
Notification of Decision

35. The Faculty Adjudicator shall, within ten working days of the hearing, inform the student, the instructor, the University Representative (if other than the instructor), the Office of Academic Integrity, the Registrar, and the student’s Associate Dean, in writing, of the decision/recommendation in each case.

36. When the Faculty Adjudicator decides that a student’s degree should be rescinded, he/she shall forward that recommendation to Senate for approval, and the Secretary of the Senate shall inform the individuals listed in the previous Section of the Senate’s decision.

37. When a student is found guilty of academic dishonesty and a penalty is levied by the Faculty Adjudicator and/or the Senate, the student shall also be informed of his or her right of appeal to the Senate Board for Student Appeals.

38. A penalty takes effect when specified by the Faculty Adjudicator and shall not be stayed by an appeal.

Student’s Status: Transcripts and Registration

39. a) When a charge of academic dishonesty is made against a student, until the case has been resolved, the student will not be issued transcripts directly but, at the student’s request, transcripts will be sent to institutions or potential employers. If the student is subsequently found guilty and the conviction results in a transcript notation, the recipients of any transcripts will be so informed by the Registrar.
   b) While under investigation for, or subsequent to being found guilty of, academic dishonesty in a course(s), a student shall not be permitted to withdraw formally from that course(s).
   c) While under investigation for academic dishonesty, a student shall not be permitted to withdraw formally from the University.

Right of Appeal

40. A decision and/or a penalty imposed under the above procedures may be appealed within three weeks after the student has been advised of the decision and/or penalty as follows:
   a) Decisions of the instructor may be appealed to the Faculty Adjudicator, by submitting a request in writing to the Office of Academic Integrity on a form prescribed by that Office.
   b) Decisions of a Faculty Adjudicator or of the Senate, (pursuant to Sections 36 and 37), may be appealed by the student to the Senate Board for Student Appeals.

Records of the Offence

41. The Office of Academic Integrity shall maintain a record of each finding of academic dishonesty against a student. The purpose of this record, which shall be kept separate from any other of the student’s records, is to determine whether there has been a previous offence, before a penalty is levied. Such a record of offences shall not be used for any other purpose.
42. When the penalty does not involve a transcript notation, the student may petition the Office of Academic Integrity to destroy the record of the offence. Such a petition cannot be made for a period of two years subsequent to the date on which the student was charged. If the petition is granted, the record shall not, however, be destroyed before the student is clear to graduate.

43. When a penalty includes a letter being placed in a graduate student's academic files, the student may petition the Office of Academic Integrity to have the letters destroyed. Such a petition cannot be made for a period of two years subsequent to the date on which the student was charged. If the petition is granted, the record shall not, however, be destroyed before the student is clear to graduate.

44. When the penalty does involve a transcript notation, and the student's petition to delete the transcript notation has been granted by the Senate, the record of the offence shall be destroyed by the Office of Academic Integrity when the transcript notation is deleted (see Sections 45 and 46 below).

45. In the event that the case is dismissed, all records of the proceeding shall be removed from the student's file.

Transcript Notations

46. General Notation
   (for notations not associated with a grade of "F", suspension, expulsion or rescinded degrees)

   When a Faculty Adjudicator determines a student is guilty of an academic dishonesty offence under the Policy that does not warrant a grade of "F", suspension, expulsion or a rescinded degree they can assign a general notation that reads: "Student found guilty of Academic Dishonesty on (list date here): This notation will be automatically removed on (insert date here)."

   No petition to Senate is required for removal of this General Notation. Such notations cannot be permanent and must include a removal date and year.

47. When a grade of "F" in a course has been levied against a student found guilty of academic dishonesty, the notation "Grade of F assigned for academic dishonesty" shall appear on the student's transcript opposite the course. Provided there are no subsequent findings against the student, the notation will be removed, and the record of the offence destroyed, upon the shorter of:

   1. five years* after the effective date of the penalty; or
   2. two years* after graduation.

The Academic Integrity Officer will provide to the University Registrar, by the end of each term a list of notations to be removed. *Notations will be removed on either April 30, August 31, or December 31 following completion of the relevant time period noted above. The number of notations removed each year under this process must be included in the annual report to the University Senate referred to in clause 6.f of the Academic Integrity Policy.
4846. When a student is suspended, the notation will read: “Suspended by the Senate for academic dishonesty for ____ months effective (date suspension starts).” A student may petition Senate for removal of such a notation subject to the following conditions:

(a) If the student returned to McMaster University:

1. at least 2 years must have elapsed since the effective date of the suspension; and
2. the student must have been cleared to graduate.

(b) If the student did not resume studies at McMaster University:

1. at least 5 years must have elapsed since the effective date of the suspension.

4847. When a student is expelled, the notation will read: “Expelled by the Senate for academic dishonesty (effective date)”. If at some later date the student is reinstated, an additional notation will read: “Reinstated by the Senate (effective date)”. Such notations may be removed from a student’s transcript on petition to Senate, but not before five years after the effective date of the expulsion.

4848. When a student’s degree is rescinded, the notation will read: “Degree rescinded by the Senate for academic dishonesty (effective date). Such notations are permanent.”
APPENDIX 1: FACULTY ADJUDICATORS

Guidelines for Selection and Operation

1. The Provost, in consultation with the Faculty Deans and the Dean of Graduate Studies, shall make recommendations regarding the appointment of adjudicators to the Senate Committee on Appointments. Adjudicators shall be appointed by Senate for a renewable three year term, to a maximum of two terms. A Faculty and the School of Graduate Studies may choose to have more than one Faculty Adjudicator, but no more than three should be appointed within a Faculty or the School of Graduate Studies.

2. a) If a Faculty Adjudicator is not available to hear a case within a reasonable time, the Office of Academic Integrity may refer the case to another adjudicator in the same or a different Faculty.
   b) Cases involving graduate students shall be adjudicated by the Faculty Adjudicator(s) appointed for the School of Graduate Studies.
   c) The Office of Academic Integrity shall ensure that all Faculty Adjudicators receive appropriate training to discharge their responsibilities.
   d) In the event that a Faculty Adjudicator has any direct interest or prior involvement in a case under consideration, another Faculty Adjudicator from the same or a different Faculty shall be appointed to hear the case.
   e) The Faculty Adjudicators shall report to the Office of Academic Integrity by October 31st of each year, summarizing their work in the previous year and making recommendations regarding modifications to the policies and procedures under which they operate, for inclusion in the Office's annual report to Senate.
APPENDIX 2: PROCEDURAL RULES FOR A HEARING

All Hearings convened under this Policy shall follow the procedures detailed below.

Parties to a Hearing

1. Parties to a Hearing shall include the University Representative, and the student against whom the allegation of academic dishonesty has been made or who is appealing an instructor’s decision that he/she committed academic dishonesty and/or the instructor’s penalty.

Notice of Hearing

2. The Parties shall be given reasonable, written notice of the hearing. In the case of the student, the notice shall be sent by registered mail to the student’s last known address, as recorded in the Registrar’s Office or School of Graduate Studies, and shall be deemed to be received one week after it was mailed.

Closed/Open Hearings

3. Hearings are normally open, but any Party to the proceeding may request a closed Hearing.

4. The Faculty Adjudicator shall determine in his/her sole discretion whether sufficient cause for closing exists. In the event that there is insufficient cause, the Hearing shall remain open.

Scheduling of Hearing

5. An attempt shall be made to schedule the Hearing at a time and place convenient for all Parties. However, if a Party, who has been notified of a Hearing date, is absent without contacting the Faculty Adjudicator with a satisfactory explanation, the Hearing may proceed in his/her absence.

Advisor

6. The student shall have the right to have an advisor present at the Hearing. Such advisor may consult with the student, but shall not be allowed to speak at the Hearing. Advisors shall not include legal counsel for the purposes of these Hearings.

Evidence

7. The student is entitled to receive, prior to the Hearing, reasonable particulars in writing of the allegation(s) against him/her.

8. Parties have the right to submit written and documentary evidence in support of their cases, prior to the Hearing, and to receive copies of any such evidence submitted by the other Party. All written and documentary evidence is to be provided to the opposing party not less than five days prior to the hearing.
9. Parties have the right to present evidence at the Hearing, including their own testimony and any further written and documentary evidence in support of their cases and to receive copies of any such evidence submitted by the other Party.

10. The Faculty Adjudicator may consider and grant a recess or an adjournment at the request of either party to allow them to review written or documentary evidence submitted at the Hearing.

11. The Faculty Adjudicator may require the production of written or documentary evidence by the Parties or by other sources. The Faculty Adjudicator has the power to call his/her own witnesses.

12. The Faculty Adjudicator must not hear evidence or receive representations regarding the substance of the case other than through the procedures described in this Policy.

13. The Faculty Adjudicator may admit as evidence at a Hearing any oral testimony and any document, written statement or other thing, relevant to the subject matter of the proceeding. The Faculty Adjudicator is not bound by the laws of evidence applicable to judicial proceedings.

Witnesses

14. Parties to the Hearing have the right to call, question and cross-examine witnesses. Parties are responsible for producing their own witnesses and paying for any costs associated with their appearance.

15. The Faculty Adjudicator may limit testimony and the questioning of witnesses where he/she is satisfied that the testimony and questioning has been sufficient to disclose fully and fairly all matters relevant to those matters he/she considers relevant to the disposition of the case.

16. The witnesses will stay in the Hearing only while they are testifying and responding to questions.

Similar Questions of Fact or Policy

17. If two or more proceedings before Faculty Adjudicator(s) involve the same or similar questions of fact or policy the Faculty Adjudicator(s) may:
   a) combine the proceedings or any part of them,
   b) hear the proceedings at the same time, or
   c) hear the proceedings one immediately after the other.

Recording

18. Although the hearing shall be audio-taped in order to obtain an accurate record of the proceedings, such recording is done for convenience purposes only and the malfunction of the recording device or subsequent loss of the recording shall not invalidate, in any way, the related hearing. The tape shall be held in confidence by the Office of Academic Integrity for a period of three years from the date of the hearing. Any party to the appeal may request access to the tape, and the reproduction thereof, upon reasonable notice and payment of the reasonable costs associated therewith.
Order of Proceedings

19. The order of the proceedings shall be as follows:

a) The University Representative shall present the charge, any supporting evidence and shall call any witnesses. The student and the Faculty Adjudicator shall be permitted to question each witness at the end of his/her testimony. The University Representative shall be permitted to clarify any new points arising from such questioning.

b) The student shall present his/her evidence and shall call any witnesses. The University Representative and the Faculty Adjudicator shall be permitted to question each witness at the end of his/her testimony. The student shall be permitted to clarify any new points arising from such questioning.

c) The University Representative may respond to any evidence presented by the student in (b) above.

d) The Parties will be permitted an opportunity to summarize their respective cases. The summary should address both the substance of the alleged offence and the appropriate penalty in the event that the allegation is determined to be valid. The student, if he or she wishes, may submit their penalty suggestions in writing to be read by the Faculty Adjudicator when deciding an appropriate penalty after concluding the allegation is valid.

Adjournment

20. The Faculty Adjudicator may grant an adjournment at any time during the Hearing to ensure a fair Hearing.

Appropriate Procedures

21. Where any procedural matter is not dealt with specifically in this Policy, the Faculty Adjudicator may, after hearing submissions from the Parties and considering the principles of fairness, establish an appropriate procedure.

22. Any procedural requirement contained in this Policy may be waived with the consent of the Faculty Adjudicator and of all Parties.
APPENDIX 3: ACADEMIC DISHONESTY EXPLANATIONS

Explanation

1. Academic dishonesty may occur in a variety of situations. This Appendix includes many examples, but is not an exhaustive list of examples of academic dishonesty.

Plagiarism

2. Plagiarism, which is the submission of material that has been, entirely or in part, copied from or written by another person, without proper acknowledgment, is probably the most common form of academic dishonesty. All material, including information from the internet, anonymous material, copywrited material, published and unpublished material and material used with permission, must be properly acknowledged. There are two aspects to using material from other sources of which students should be aware. In a direct quotation of text or material, it is important to distinguish the text or material that has been taken from the other source. Common methods of identification of directly quoted material include indentation, italics, quotation marks or some other formatting change to separate the quoted material from the student's own work. Indirectly quoted material involves expressing an idea, concept or interpretation that one has obtained from another source, in one's own words. Direct and indirectly quoted material requires a reference or footnote in the text and full citation in the references or bibliography, in accordance with the standards appropriate to the discipline.

Oral Presentations

3. In the case of oral presentations, the use of material that is not one's own, without proper acknowledgment or attribution, constitutes plagiarism and, hence, academic dishonesty.

Music

4. In Music, the imitation of style is an integral part of the student's work. In applied music, for example, a student may be required to model an interpretation of a piece around that of a particular performer, and in music theory courses it is a routine procedure to imitate the stylistic characteristics of particular periods and even of particular composers. Nevertheless, it is possible to draw certain lines. For example, it would obviously be improper for a student to submit as personally representative, a tape recording of someone else performing. It would also be wrong, just as it would be in the case of an essay, for a theory or composition student to hand in as personal work, material composed by another. Clearly, the imitation of style ceases to be legitimate when the student begins to draw upon actual notes or sounds attributable to another person. This would not preclude a professor from, say, giving the student material to work with from a pre-existent composition (for example, a figured bass, or a fugue subject) providing the sum and substance of the work from that point on were the student's own.
Studio Art

5. Students of studio art (painting, sculpture and print-making) may be guilty of plagiarism if they submit for evaluation as course assignments works executed in their entirety by someone else, or in part by someone other than the instructor. Similarly, copying works from sources not authorized by the instructor may be regarded as improper borrowing, which is analogous to plagiarism and is an act of academic dishonesty.

Computer Software

6. The improper use of the computer files and programs of others may constitute academic dishonesty. The instructor who is responsible for specifying the way in which the work is to be done determines the degree of permissible co-operation among students. Students who allow their computer files or assignments to be copied are as guilty of academic dishonesty as those who copy. Each student is responsible for protecting his or her computer file by keeping the password secret and changing it frequently.

Multiple Submissions of the Same Material

7. The submission of an assignment, report or essay, which has been submitted at an earlier date for a different course, is an act of academic dishonesty unless the instructor has specifically authorized it in advance. The submission of the same essay in each of two courses, which are being taken concurrently, is acceptable only if both instructors have given prior approval.

In Tests and Examinations

8. In all tests and examinations, including take-home examinations, students are expected to work strictly on their own, using only aids authorized for use in the examination or test area by instructors or invigilators, or when group work has been explicitly authorized by the instructor. Copying or using unauthorized aids constitutes academic dishonesty.

Inappropriate Collaboration

9. Collaborative learning is a valuable method of instruction that is utilized by many instructors at McMaster University. Students will often be encouraged to discuss ideas and concepts with one another to facilitate the learning process. A distinction must be drawn, however, between collaborative learning and collaboration on assignments. Assignments, projects, reports, etc. are required to be completed by an individual unless the instructor indicates some kind of collaboration is permissible.

10. Inappropriate collaboration occurs when students work together on an assignment that was intended as an individual assignment or when students work together in groups beyond the degree of permissible collaboration.

11. Instructors are expected to outline the appropriate level of collaboration on course outlines and/or on each assignment. When group work is acceptable, but not required, the instructor is
responsible for specifying the way in which the work is to be done and for determining the degree of permissible collaboration among the students.

12. Students are directed to assume all assignments are intended to be done individually unless otherwise directed by the instructor. Students are expected to ask questions and clarify the collaboration expectations for each assignment if they are unsure of the instructor's expectations. Students are also expected to use standard citation rules to identify any part or section of their assignment that is not original.

Research Misconduct

13. The two principles underlying integrity in research in a University setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the aegis of McMaster University. It is incumbent upon all members of the University community to practice and to promote ethical behaviour. (Please refer to the Research Integrity Policy "Research Ethics at McMaster University" policy for more details.)
APPENDIX 4: GENERAL PENALTY GUIDELINES

Explanation

1. Each case of academic dishonesty is investigated, heard and decided upon the merits of the case. The following penalty guidelines are general and can be adjusted by the Faculty Adjudicator hearing the case, according to the merits of the case to be harsher or more lenient.

Admissions Fraud

2. If a student is found to have gained admission to McMaster University through fraudulent means, the penalty is generally suspension or expulsion with a transcript notation.

Undergraduate Students

3. The first time an undergraduate student is found guilty of academic dishonesty, the penalty is generally either a letter or a grade reduction or a zero on the assignment in question, but is most often a zero.

4. The second time an undergraduate student is found guilty of academic dishonesty, the penalty is generally "F" in the course with a transcript notation.

5. The third time an undergraduate student is found guilty of academic dishonesty, the penalty is generally "F" in the course with a transcript notation and suspension or expulsion with a transcript notation.

Undergraduate Serious First Offences

6. If a student is found to have committed a serious first offence, the penalty is at the discretion of the Faculty Adjudicator and will be determined based on the merits of the case.

Graduate Students

Course Work

7. The first time a graduate student is found guilty of academic dishonesty or research misconduct in course work, the penalty is generally assigned within the parameters of the course, e.g., a zero on the assignment or "F" in the course with a transcript notation.

8. The second time a graduate student is found guilty of academic dishonesty or research misconduct in course work, the penalty is generally suspension or expulsion with a transcript notation.
Comprehensive/Qualifying Examinations

9. If a graduate student is found to have committed academic dishonesty on a draft of a comprehensive/qualifying exam or on a comprehensive/qualifying exam, the penalty can range from a letter in the student's academic files to a failing grade on the exam to suspension or expulsion.

Thesis Work on Research Work

10. If a graduate student is found to have committed academic dishonesty on thesis work or research work, the penalty can range from a letter in the student's academic files to an Unsatisfactory on the relevant supervisory committee meeting report to suspension with a transcript notation or expulsion with a transcript notation depending on the severity of the offence.

Thesis

11. If a graduate student is found to have committed academic dishonesty on a thesis submitted for defense the penalty is generally suspension with a transcript notation or expulsion with a transcript notation.*

* If the graduate student has a previous offence of academic dishonesty on their record, it will be considered as part of determining the appropriate penalty.

Consequences

12. Many penalties assigned for academic dishonesty will have academic consequences for students, e.g. a zero on an assignment combined with the student's other grades in course work results in an "F" in the course; an "F" in a course when combined with the student's other grades may result in the student being put on academic probation, etc. These consequences will not be considered when deciding a penalty for academic dishonesty; the penalty is decided based on the merits of the case.
To: Senate

From: Christina Bryce  
Assistant Graduate Secretary

Re: Report from Graduate Council

At its meetings on November 17th, January 19th and via e-ballot on November 23rd, 2015, Graduate Council approved the following for recommendation to Senate:

1. **New Program Proposal: Ph.D. in Communication, New Media and Cultural Studies** (attachment)
   
   The proposed Ph.D. is interdisciplinary and designed by two different departments: English and Cultural Studies and Communication and New Media. It brings together the expertise in both departments to design a Ph.D. for students who want to go into academia as well as those who want to be trained in critique and media production. This Ph.D. will teach students literacies in communication studies, how to communicate, as well as the power of communication and producing media. Further, Communication Studies is a growing field with a variety of employment options and the proposed Ph.D. would allow students to capitalize on this. The proposed start date is September 2017.

2. **Faculty of Social Sciences**

   **Sociology**
   
   **Change to Admission Requirements**
   
   The program proposed a change to their admission requirements to formally open admission to students in other social scientific disciplines. This change reflects current admission practices. This change would be effective September 2016.

For Information:

3. **Faculty of Social Sciences**

   **Anthropology**
   
   **Change to Ph.D. Course Requirements**
   
   Currently, students promoted from within the M.A. program (these students have completed the required coursework but are promoted before completing the thesis or MRP) are required to take a
total of eight half-courses in the program over the course of their enrolment. The program proposed an option that would allow for accelerated progress for students with sufficient training and background to enable them to start directly on their comprehensive exams. Suitability for this move would be determined by the supervisor in consultation with the Graduate Director and/or Department Chair.

Change to Specialization Name
The program proposed changing the name of one of their specializations from ‘Physical’ to ‘Biological’ to better reflect the current state of the discipline and program.

Sociology
Change to Name of Research Area and addition of Comprehensive Examination Area
The program proposed changing the name of the research area Sociology of Work to Sociology of Work and Occupations and adding a comprehensive examination of the same title.

Revision to Calendar Copy
The program proposed a change to their calendar copy to clarify the regulations around the number of times a student is allowed to take a previously-approved supervised research course.
McMASTER UNIVERSITY

GRADUATE PROGRAM PROPOSAL BRIEF

FOR THE PROGRAM

Doctor of Philosophy (PhD) in Communication, New Media, and Cultural Studies

October 16, 2015

Document prepared by
Drs. Christina Baade, Lisa Kabesh, Andrew Mactavish, Susie O’Brien, Mary O’Connor, Carolyn Veldstra and Peter Walmsley
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PROGRAM

1.1 Program Description

The problems we face today—social and environmental injustice, climate change, precarious work, surveillance, and a shrinking public sphere—are big, and they are complex, demanding approaches from diverse disciplines. In addition to their technological, scientific, economic, and political dimensions, these are all problems of culture and communications. The PhD in Communication, New Media, and Cultural Studies (CNMCS) is for creative students who embrace complexity, love difficult questions, and hunger for intellectual, artistic, and pedagogical risk-taking driven towards positive social change. In this program, problems drive theory.

This program brings together three interdisciplinary fields that all originated in attempts to understand and debate big problems using tools from the arts, humanities, and social sciences: cultural studies began by trying to articulate the significance of culture beyond the privileged space of the university, communication studies wanted to understand how mass media was changing modern society, and new media scholars and artists wanted to probe how computing and digital communications were changing human knowledge and creativity. Each of these fields understands that the problems we face today, with all their varied technological, economic, ecological, and political implications, are, fundamentally, problems of communication and culture. Learning to read, critique, and create culture, media, and communication is critical to seeing things, and doing things, in new ways.

A core concept in this program is *literacy*. Understood far more expansively than simply the traditional liberal-arts sense of the word, in this program literacy encompasses knowledge of the textual, the visual, the sonic, the artistic, the communicative, the performative, the social, the emotional, and the digital. A significant aspect of literacy is being able to work through the beliefs and values that appear to be common sense. For this reason, the program places significant emphasis on the work of *critique*. Students will receive a solid foundation in key theories in media, communication, and cultural studies, as well as media arts. This reading will enable them to not only master and synthesize established disciplinary knowledges, but also understand the historical contexts in which those knowledges circulate, reflecting and reproducing particular social relations and power dynamics. Significant attention will be focused on cultivating an understanding of the ways in which histories (material and social) inform the present. In this way, the program’s core focus on literacy also entails a belief that education is a democratic value, extending and engaging beyond the university and encouraging a respect for embodied, subaltern, and practice-based knowledges that have historically been excluded.

In order to deploy the tools of new media, communication, and cultural studies to engender positive change, it is necessary for students to not only learn how to read and critique the messages, ideas, and practices that they encounter, but also develop their abilities as cultural producers, whether that output lies in artistic production, research creation, scholarship, or pedagogical innovation. To this end, the
program will hone students' conceptual, critical, and technical skills as makers and media artists, teachers, cultural workers, researchers, and communication professionals.

The Departments of Communication Studies and Multimedia (CSMM) and English and Cultural Studies (ECS) share interests in communication, representation, cultural production and critical literacy in the context of social responsibility. Our many complementary strengths in areas including new media arts, performance, policy, visual culture, digital culture, music/sound, gender and sexuality, critical race studies, indigenous studies, postcolonial and diasporic studies, transnational culture and international communications, critical environmental studies, political economy, professional communication, and media analysis and strategy, will enable us to mount a coherent yet flexible interdisciplinary program that will attract students from our own and other MA programs. The program will draw faculty members from CSMM and ECS as well as other departments in the Humanities to act as supervisors of CNMCS doctoral students. It will draw on faculty members from both Humanities and Social Sciences to act as committee members and graduate seminar instructors. Students will have considerable scope in shaping their committees according to their research/project needs.

Graduates of the program will be equipped with advanced research skills that are in wide demand in the labour market, particularly the policy, not-for-profit, private and education sectors. The program’s emphasis on rigorous interdisciplinary training and professionalization will equip students with advanced cultural, social, and digital literacies; the ability to navigate and innovate in multiple modes of communication; and the capacity for analyzing and engaging complex systems and problems. In particular, this training will make students competitive in the growing academic job market in communication and new media.

The PhD will normally entail four years of study, consisting of coursework in the first year (plus the Foundation seminar I and II, which are two 3-unit courses taken in years 1 and 2), preparation and completion of comprehensive exams in the second year, and the completion of the thesis or culminating project in the third and fourth years.

The capacities identified above (literacy, critique, creativity) will provide a framework for the program, which will focus on large yet clearly defined problems and questions. These will vary from year to year, driven by both faculty and student interests, and will be the subject of intensive day-long problem solving activities during an orientation week. All students will take Foundation seminar I and II: Problems in Communication, New Media and Cultural Studies, extending the problem-based focus, engaging in a rigorous exploration of method and theory in interdisciplinary research as well as providing seminars and professionalization workshops that focus on building skills necessary for careers both in and outside the university.

In addition to the foundation seminars, students will take the equivalent of four 3-unit courses in their first year. Coursework will draw on existing offerings, which encompass both seminars organized around
specific concepts, themes, and methodologies, and hands-on lab-based media arts courses. Three units (i.e., one half course) may be an elective taken from another department, subject to consultation with program directors, and permission from the department offering the course. Faculty members in both departments demonstrate a strong record of securing funding for research and media arts projects, which will provide students in the program potential experiential learning opportunities in the form of RAships.

In February of the second year, students will complete comprehensive exams, consisting of a field survey and a topic paper and an oral defense.

With the aim of facilitating timely completion and giving students the opportunity to pursue projects that are in line with their own interests, talents, and employment goals, the post-comprehensives component of the program will comprise one of the following:

- the traditional thesis route
- a research-creation (project-based) thesis route
- a sandwich thesis: in accordance with McMaster’s Thesis Preparation Guide, a sandwich thesis must consist of a minimum of three scholarly works on a unified theme (in CNMCS, these works may include journal articles submitted for peer review, or art/media/performance pieces submitted for peer-adjudication), either previously published or exhibited, submitted for peer-review, or prepared for publication/exhibition but not yet submitted; these works must be accompanied by substantial introductory and concluding chapters, addressing the methodologies, theories and approaches that unify and inform the research

Detailed descriptions of the program curriculum, including the multiple routes to thesis completion, can be found in Section 3.2 Structure and Regulation.

### 1.2 Proposal Preparation and Consultation Process

This proposal began as a collaboration between the Departments of Communications Studies and Multimedia (CSMM) and English and Cultural Studies (ECS) and was developed through extensive consultation with relevant stakeholders. Below we offer a brief list of stakeholders consulted, and then provide a more comprehensive description of the consultations undertaken during the preparation of the proposal.

**Overview of consultations:**

- The Departments of ECS and CSMM
- Faculty of Humanities (Dean and Associate Dean, Graduate Studies and Research)
- Tenured and tenure-stream faculty in ECS and CSMM
- Tenured and tenure-stream faculty from related departments
• Chairs/directors of related departments
• Current graduate students and alumni of:
  ○ Communication and New Media (CNM) and Cultural Studies and Critical Theory (CSCT) MA programs
  ○ English MA and PhD programs
• Amy Gullage, Quality Assurance Programs Coordinator at the McMaster Institute for Innovation and Excellence in Teaching and Learning (MIIETL)
• Wade Wyckoff, Associate University Librarian, Collections
• Directors of relevant on-campus service units, centres, and research projects:
  ○ Henry Giroux, the McMaster University Chair for the Centre for Scholarship in the Public Interest (MCSP)
  ○ Don Goellnicht, Director of the Institute on Globalization and the Human Condition
  ○ Dale Askey, Administrative Director of the Lewis and Ruth Sherman Centre for Digital Scholarship
  ○ Daniel Coleman, Co-Director of the Centre for Community-Engaged Narrative Arts (CCENA)
  ○ John Bell, Director, I.T., Humanities Media and Computing (HMC)
  ○ David Harris Smith, Director of Research, MacGRID Simulation Research Platform and Network
  ○ Carl Podedwory, Director and Chief Curator, and Ihor Holubizky, Senior Curator, the McMaster Museum of Art

The following is a more specific outline of the collaborations that have supported the development of the proposed program:

In June 2014, a joint committee of four was struck by the two departments to explore the possibility of a new, joint PhD program: the Directors of the MA programs in CSCT and CNM (Susie O’Brien and Christina Baade) and the Chairs of the two departments (Andrew Mactavish and Peter Walmsley). The joint committee developed a short description of the proposed program, which was sent to the Dean, Ken Cruikshank, and Associate Dean of Graduate Studies and Research, Bonny Ibhawoh, of the Faculty of Humanities, who agreed that the program offers a unique opportunity for the Faculty to take advantage of the research and pedagogical strengths of both departments.

From there, the joint committee developed a short summary of the program, which was circulated back to the Deans and presented to tenured and tenure-stream faculty in both departments for input. In November of 2014, the short proposal was discussed in department meetings by tenured and tenure-track faculty in both ECS and CSMM and informal support for the proposal was expressed. Subsequently, the CSMM faculty caucus voted in support of the proposed program on December 15, 2014 and ECS voted to formally proceed on February 4, 2015.
This same short summary of the proposed program was the subject of a Town Hall Meeting held on February 10, 2015 and open to any interested faculty members in the Humanities. The Town Hall evidenced support for the proposed program in both departments, as well as indicating interest among some faculty in the School of the Arts, French, and History.

In April of 2015, the joint committee hired educational consultants Lisa Kabesh and Carolyn Veldstra to assist in producing the program proposal. In April and May of 2015, they conducted in-person interviews with tenured and tenure-stream faculty in Communication Studies and Multimedia. Using both online and face-to-face methods, they also interviewed tenured and tenure-stream faculty in English and Cultural Studies who currently teach and supervise in the Critical Theory and Cultural Studies B.A. and M.A. programs. Most faculty indicated their support for the proposed program. See APPENDIX 3: Interview & Survey Summaries (Faculty) for survey and interview summaries.

At this stage, tenured, tenure-track, and associate faculty members in ECS and CSMM who wished to serve as core faculty in CNMCS indicated so by submitting a current copy of their CVs to the joint committee. We define “core faculty” as those faculty members who will act as supervisors to the program’s students, and who may be willing to take on administrative and leadership roles in the program as needed, including involvement in the foundation seminars. See the attached USB for core faculty members’ CVs. For a full list of core faculty, see Section 6.2.III: Faculty.

Also in April 2015, the educational consultants met with the graduate student caucus in ECS to discuss the proposal, answer questions, respond to concerns, and solicit feedback. Following up on this conversation, in May 2015, the educational consultants sent an online survey to current and recent graduate students in English and Cultural Studies and Communication Studies and Multimedia to gauge interest in the proposed program and collect feedback. See APPENDIX 4: Consultation & Survey Summaries (Alumni & Current Students) for survey and consultation summaries and APPENDIX 1: Letters of Support for the letter written in support of the proposed program by the ECS caucus.

This consultation process, consisting of meetings, interviews, surveys, and follow-up emails and meetings with faculty members and students, evidenced extensive support of the program. A number of faculty members expressed excitement about the proposed program and about the potential to work with students in the program both on committees and in their courses. A significant quantity of current students and alumni also expressed strong support of the program; a discussion of student support can be found in Section 1.6.II Evidence of Student Demand, Evidence of Student Demand. Concerns were raised by faculty members and students about supervision loads and the capacity for future growth. The joint committee emphasizes that the proposed program, which is based on the current capacities of ECS and CSMM, is well situated to support a steady state of 12 students (3 per year), and communicated with stakeholders that future growth is dependent on the availability of additional resources. Section 6.2 Resources: Graduate Programs provides a detailed account of the program’s resources and capacities.
In addition to the core faculty associated with the proposed program within the two departments proposing the joint PhD, the following faculty have expressed interest in supporting the program by serving as readers on supervisory committees, and potentially having the program’s students in their courses (see APPENDIX 1: Letters of Support for letters of support):

- Professor Alison McQueen, Department of History and School of the Arts
- Associate Professor Karen Balcom, Department of History
- Assistant Professor Alina Sajed, Department of Political Science
- Professor Magda Stroinska, Department of Linguistics and Languages
- Associate Professor Michael Egan, Department of History
- Associate Professor James Ingram, Department of Political Science
- Associate Professor Jean Wilson, Arts and Science Program
- Associate Professor Tracy McDonald, Department of History
- Associate Professor Gabriel Moyal, Department of French
- Professor Petra Rethman, Department of Anthropology
- Associate Professor Celia Rothenberg, Department of Religious Studies
- Assistant Professor Nicholas Serruys, Department of French
- Associate Professor Allison Williams, School of Geography and Earth Sciences

On May 12, 2015, the joint committee met with Amy Gullage from MILET to develop the program learning outcomes for the proposed PhD. In the same month, the joint committee consulted with Wade Wyckoff, Associate University Librarian, Collections, to ensure that the University Library would be able to support the new program. See APPENDIX 2: Library Report for the Library Report.

On June 1, 2015, members of the joint committee met with Dale Askey, Administrative Director of the Sherman Centre, who outlined the many ways in which CNMCS students could be involved in the Sherman Centre community. In July, a committee member met with Carl Podedwory, Director and Chief Curator, and Ihor Holubizky, Senior Curator, of the McMaster Museum of Art to discuss potential collaborative opportunities for the program’s faculty, students, and the museum. See the attached letters for more detail on the Sherman Centre’s and the Museum of Art’s support (APPENDIX 1: Letters of Support).

In June and July of 2015, a short brief outlining the proposed program was circulated to Department and Program Chairs in the Humanities along with an invitation for feedback on the proposed program and a request for their department’s support. The following departments have indicated their support for the proposed PhD in CNMCS (see APPENDIX 1: Letters of Support):

- Anthropology
- Classics
- French
- History
- Indigenous Studies
- Linguistics and Languages
- Peace Studies
- Philosophy
- Sociology
- The Institute on Globalization and the Human Condition (IGHC)
- The School of the Arts (SOTA)

The following on-campus programs, institutes, research clusters, or projects have indicated their support for the proposed program and willingness to work with qualified students admitted to the proposed PhD (see APPENDIX 1: Letters of Support for letters of support):
- Centre for Community-Engaged Narrative Arts (CCENA)
- Humanities Media and Computing (HMC)
- macGrid Simulation Research Platform and Network
- McMaster Centre for Scholarship in the Public Interest (MCSPI)
- McMaster Museum of Art
- Institute for Globalization and the Human Condition

By the end of June 2015, the educational consultants had completed a full draft of the proposal, which went to the joint committee for review.

1.3: Consistency with McMaster's Mission and Academic Plan

The university’s mission statement is as follows:

At McMaster, our purpose is the discovery, communication, and preservation of knowledge. In our teaching, research, and scholarship, we are committed to creativity, innovation, and excellence. We value integrity, quality, inclusiveness, and teamwork in everything we do. We inspire critical thinking, personal growth, and a passion for lifelong learning. We serve the social, cultural, and economic needs of our community and our society.

As this proposal makes clear, the proposed PhD in Communication, New Media, and Cultural Studies amplifies the bold aspirations McMaster expresses in its mission statement. The two departments collaborating on this proposal—Communication Studies and Multimedia and English and Cultural Studies—boast high levels of faculty and graduate student research productivity and knowledge-creation, publishing in leading journals, creating innovative digital media projects that garner national
attention, earning major national grants, and seeking to address fundamental ethical issues facing our city and society. Graduate students in both departments have been awarded Hooker Fellowships, and Vanier, SSHRC, Trillium and OGS scholarships (for a full breakdown of graduate student awards in both departments, see APPENDIX 7: History of Graduate Student Scholarships & Awards). Both support students in the process of becoming not only skilled critical thinkers and productive creative workers, but also engaged citizens.

McMaster is differentiated by its research-intensive approach, unique pedagogical emphasis on problem-based learning and inquiry, and distinctively collaborative culture. The proposed PhD in Communication, New Media, and Cultural Studies is distinguished by these same metrics, emphasizing high-quality, socially- and culturally-engaged research, developing a problem-based focused to learning and teaching at the PhD level in the Humanities, and arising out of a collaboration between two Humanities Departments in recognition of the fundamental interdisciplinary affinities between them.

In particular, the proposed program will exemplify McMaster’s mission in the following ways:

- Faculty members to be involved in the program’s administration, supervision, and teaching demonstrate high levels of research productivity and a commitment to rigorous peer-review, publishing cutting-edge research with presses and journals of international stature, exhibiting artistic work internationally, and earning major national grants. Faculty consistently bring discoveries into the undergraduate and graduate classroom.

- The program’s commitment to creativity, innovation, and excellence is exhibited both in the quality of faculty members’ research and in the progressive design of this interdisciplinary program. The diversity of research conducted by faculty and invited from students will enable the transfer and exchange of new knowledge across the fields of communication, new media, and cultural studies, both within the program and beyond as graduates bring their unique skill sets to academic and non-academic fields.

- The program will establish the highest standards of academic integrity in research and learning, and the ongoing, interdisciplinary collaborative work of faculty members will be mirrored in the program’s emphasis on student-faculty collaboration in research, learning, and program governance.

- Students will develop vital critical and creative capacities through the program’s progressive pedagogical design. Along with diverse course offerings in theory, methods, and artistic and media practice, the program’s multiple pathways to completion are designed to foster intellectual autonomy in students as they cultivate both critical and creative skills and interests in line with their research and professional goals.

- The program emphasizes the development of advanced cultural, social, and digital literacies and an understanding of the power dynamics at work in contemporary culture, preparing students both for fulfilling careers beyond their degree and active engagement in society.
1.3.1: McMaster’s Strategic Mandate Agreement

McMaster’s Strategic Mandate Agreement (SMA) identifies a number of areas of institutional strength (see page 10 of the SMA). The proposed PhD in Communication, New Media, and Cultural Studies will address the following: 1) Digital economy; 2) Policy and ethics in a globalized world; 3) Human behaviour, culture, and society; and 4) The arts and creative expression.

1) Digital economy

Faculty in the Department of Communication Studies and Multimedia are working at the forefront of research into the emerging digital economy that is fundamentally shaping and reshaping the contemporary world. This work takes place both at a theoretical level, in terms of understanding shifting digital technologies and their effect on shared social and cultural life, and at the level of practice, in terms of building and engaging with digital technologies to produce new sounds, environments, and tools. The proposed program would augment this existing research by developing student research in these areas at a doctoral level. High-level research and practice in digital media and coding will support faculty members in developing long-term, robust research projects with the support of a skilled base of co-researchers, digital media artists and practitioners, and coders. Students in the program will graduate with the deep knowledge and/or practical skill necessary to not only successfully navigate but also shape the shifting landscape of digital economy.

Collaborations between the program and related research projects and centres will also enrich students’ engagement in digital research. For example, students in the program will have access to the virtual world simulation resources of the macGRID Research Simulation Platform and Network, of which core faculty member David Harris Smith is Director of Research. As a research initiative that seeks to develop the design, implementation, and analysis of a massive online 3D virtual environment, macGrid has the potential to support a wide variety of graduate thesis topics among students of the proposed program. In addition to macGRID, The Sherman Centre for Digital Scholarship will provide a valuable resource for students in the program. In recent years, Masters and Doctoral students in CSMM and ECS have benefitted from the IT infrastructure and shared office space offered by the Sherman Centre to students working on digital projects. The space of the Centre allows students and researchers working on digital projects to share knowledge, develop collaborative projects, and establish a community of researchers conducting digital scholarship. The infrastructure provided offers some access to technologies often necessary to develop work in this field, and the Sherman Centre’s connections to the broader campus community affords students a platform to publicize and receive feedback on their work. In these ways, the proposed program will further develop the profile of the Sherman Centre as a site of innovative work in the digital humanities in Canada.
See APPENDIX 1: Letters of Support for letters of support from Dale Askey, Administrative Director of the Sherman Centre, and David Harris Smith, Director of Research, macGrid.

2) **Policy and ethics in a globalized world**

One of the key lines of affinity between the Departments of Communication Studies and Multimedia and English and Cultural Studies lies in their shared commitment to working through the ethical dimensions of critical political, social, environmental, and cultural problems. CSMM and ECS house faculty whose research examines the ethical implications of policy decisions in global communications networks, the ethics of various modes of representation across lines of difference (gender, race, sexuality, ability), the politics of transnational and diasporic migration, the political and ethical implications of technological shifts, the ethical valences of environmental discourse, and the ethical possibilities of critical pedagogy. Among the core faculty who will be affiliated with the proposed program, several participate in research or research-creation that would benefit from an increased doctoral presence and would further McMaster's contributions in these areas. For instance, Sara Bannerman's work on transparency in global copyright and intellectual property; Liss Platt's engagement in the Anti-Colonial Project (a group working on making films meant to address issues of colonialism in a widely accessible manner); Daniel Coleman and Lorraine York's efforts in expanding the university into the community through the Centre for Community-Engaged Narrative Arts & the Studio in Canadian Literary Cultures, in partnership with the Hamilton Public Library; and Paula Gardner's work with FemTechNet, a feminist network of scholars, artists, and students who collaborate on the design and creation of feminist technological innovations, as well as her Hyper Migration project (OCE funding) in collaboration with the Toronto Refugee Centre, an open storytelling platform for multimedia telling of stories of displacement and resettlement.

The proposed program's problem-based approach will foreground the necessity of ethical response in the context of local and global problems. To this end, the program's foundation seminars will develop students' capacities as critical thinkers, communicators, and makers, encouraging students to grow as leaders who foster an ethically engaged approach in their own research and beyond. Drawing out this shared commitment between these two departments, the proposed program would also enhance McMaster's role as an institution dedicated to the pursuit of integrity through a commitment to social justice.

3) **Human behaviour, culture, and society**

A second point of intersection between CSMM and ECS, and a foundational focus of the new program, lies in an emphasis on deepening our understanding of communication and culture and the place of the human within these matrices. At its core, the research undertaken in the two departments supporting this proposal works to expand our knowledge of how and why societies function as they do and to what ends, taking up these questions in a variety of ways, from creating virtual digital worlds in which to experiment with alternative arrangements of
social, human, organizational and community space to interrogating the ways in which we think about bodies in order to gesture towards alternative body politics. The proposed program would provide a platform from which to develop research and pedagogy around the fundamental concerns that shape the intersections of communications, new media, and cultural studies. The proposed program will amplify current lines of inquiry, and encourage new ones, underscoring McMaster’s central commitment to developing new knowledge in all fields.

The program’s problem-based focus will allow students and faculty to develop meaningful interdisciplinary research programs that respond to the urgent issues of the present moment. The inclusion of new media as a key site of inquiry in the proposed program recognizes the fundamental impact digital and other new media forms and technologies are having on human behaviour, both in the form of reshaping communications and also in terms of teaching, learning, and research. The program will also embrace critical historical approaches to new media, interrogating how “newness” has historically been framed in modern societies and how “older” technologies persist in complex ways. The proposed program, then, will foster students who are adept at navigating—both in terms of their research or production and pedagogical approaches—the key problems posed by a digital communications culture.

4) *The arts and creative expression*

CNMCS will become a hub for the arts and creative expression within the Faculty of Humanities. Several digital media projects currently developing through collaborations with CSMM faculty would create opportunities for students in the proposed program to deepen their own research creation practices. For instance, faculty in CSMM have either founded or work collaboratively in: the Centre for Networked Imagination (proposed and nearing final approval as of spring 2015); the Anti-Colonial Project; the Centre for Community-Engaged Narrative Arts & The Studio in Canadian Literary Cultures, and macGRID, an open-source digital-world development project (supported by an Insight Development Grant). Core faculty in both departments have also enjoyed a history of collaboration with the McMaster Museum of Art (MMA) in the curation of art exhibitions and in hosting visiting speakers (creators and academics) for lectures and panel discussions. For example, the MMA has co-curated ambitious exhibitions and programming with core faculty in the new program: Sarah Brophy and Janice Hladki’s *This is Me, This is Also Me* (Spring 2015) and *Scrapes: Unruly Embodiments in Video Art* (Winter 2011); Janice Hladki’s *Fierce: Hot-Blooded Film/Video* (2010); and Mary O’Connor and Janice Hladki’s *Embodied Matter* (2006). The work of Liss Platt, in various media, has also been shown at the Museum, and other faculty have contributed to programming, including Mary O’Connor presentation on the National Gallery’s *Margaret Watkins: Domestic Symphonies* (2014).

Beyond McMaster, Mary O’Connor curated *The Archive and Everyday Life*, exhibited at the Ontario Science Centre (Spring 2015) and The Hamilton Artists Inc. (Spring 2010); Liss Platt has shown work in video, film, and photography in individual and group exhibits at galleries across
Canada and the United States, including exhibitions in Hamilton and Toronto and the Museum of Modern Art in New York; David Harris Smith’s hitchBOT—a hitchhiking robot—has been exhibited at galleries and museums across Canada and has received extensive media coverage; Robert Hamilton has established an international presence as a film artist, exhibiting his work in North America, Europe, and South America; David Ogborne stages performances of live-coded music at festivals and venues worldwide; and Paula Gardner has curated exhibitions of PORTAGE; A Canadian Mobile Experience (2007, 2008) in Toronto, Vancouver, and Sao Paulo, Brazil. Graduate students in both departments have consistently produced artistic work, either alongside or as part of their research. The proposed program would offer a greater chance to engage collaboratively in these kinds of research-creation and creative arts practices, formally integrating them into the requirements of the PhD and fostering their development through faculty-student partnerships.

Additionally, the SMA identifies a number of priority areas of institutional growth (see page 10 of the SMA). The proposed PhD in Communication, New Media, and Cultural Studies will primarily serve growth in the area of communications and culture.

1) Communications and culture
The proposed program offers a keystone contribution to this area in drawing together precisely the complementary fields—Communication Studies and Cultural Studies—that shape this priority area defined by the SMA. The inclusion of new media as a core area of focus in the proposed PhD also draws in the digital as a fundamental metric in thinking about and engaging in communication and culture today. The program’s emphasis on literacy, in the broadest sense of that term, understands the three core components of the program as foundational to ethically engaged citizenship.

The focus of the proposed program on central problems being worked out in communications and culture draws one of McMaster’s signature pedagogical innovations, problem-based learning, into graduate-level Humanities instruction. This approach augments the interdisciplinary focus of the proposed program by focusing on high-level issues and critique that span traditional disciplinary boundaries. The proposed program will thus enhance McMaster’s presence as the site of problem-based pedagogy in Canada, while offering students an innovative pathway through the Humanities PhD.

2) Fostering robust societies
The proposed program will also support McMaster’s stated interest in supporting growth in the area of fostering robust societies. Robust societies are built by engaged citizens who are attentive to the lines of inclusion and exclusion by which societies are constituted. The proposed program’s focus on critical literacies, pressing social and cultural problems, and creative and
innovative problem-solving will develop the skills communities and societies require to become thriving, inclusive, and welcoming environments.

1.3.II: McMaster’s Current Priorities: Forward with Integrity

In his 2011 letter to the McMaster community, *Forward with Integrity (FWI)*, President Patrick Deane sought to establish a way forward for McMaster that would build upon the University’s historical strengths while adapting to the realities of an educational and research context transformed by the digital revolution. *FWI’s* principles prioritize the development of human capacities, multidisciplinarity, radical questioning, criticality in practice, and cooperation, all of which are core to the proposed program in Communication, New Media, and Cultural Studies, as discussed above. In particular, the proposed program meets the four priority areas established in *FWI*: the student experience, community engagement, research, and internationalization. Our program engages these institution-wide priorities in ways responsive to the program’s particular Program Learning Outcomes and to the strengths and methodologies of the Humanities.

The Student Experience

*FWI* turns to McMaster’s flagship undergraduate programs—Arts and Science, Engineering and Management, Bachelor of Health Sciences, Integrated Science—to highlight McMaster’s capacity to advance innovative instructional and curricular design even as it advances its high-level research profile. While *FWI* focuses on undergraduate education, we see the value placed on self-directed learning as a core component of graduate education. In particular, we seek to establish problem-based learning and interdisciplinarity as pedagogical priorities in the proposed program in Communication, New Media, and Cultural Studies.

1) Experiential learning

Students in the proposed program will have the option of following one of three pathways to degree completion, two of which explicitly involve experiential learning. The research-creation (or project-based) thesis affords students the opportunity to deeply and actively engage in their subject area by developing, completing, and theorizing an arts-based project, and the sandwich-thesis allows students the opportunity to draw together conference presentations, publications, community engagement projects, art works, performances, or exhibitions, as well as published articles to comprise a modular thesis. In both of these options, students will develop arts and digital media skills while engaging with and contributing to discoveries and innovation in scholarship. Opportunities for students to collaborate with faculty members in ongoing interdisciplinary, community-engagement, and arts-based projects will also be open to students whose interests and qualifications align with these projects, regardless of the route students opt for in their thesis work. Faculty members involved in the program are keen to supervise and mentor students in provincially and nationally funded arts and research projects (see Sections
6.2.III: Faculty and 6.2.V: Faculty Research Funding for a detailed accounting of faculty members’ research and artistic profiles). The remarkable track record core faculty have demonstrated in winning competitive university, provincial, and national grants (including SSHRC Insight grants, Canada Research Chair positions, Canada Council Creative Development grants, GRAND NCE grants, McMaster Incentive grants, the inaugural Paolo Freire Chair, and a McMaster University Scholar position) augurs a promising trend supportive of ongoing, diverse research assistantships for graduate students in the program.

2) **Self-directed learning**

   In *Forward with Integrity: The Emerging Landscape*, the FWI Advisory Group advocates for “educating for capability,” which is defined as “continual growth, the ability to adapt, improve performance and generate new knowledge.” This emphasis on capability is one of ongoing self-directed learning and is nurtured by PhD study at McMaster. Students will develop self-directed learning capacities in the program as they complete each stage of their degree requirements: coursework, comprehensive exams, the development of a thesis proposal, the development of their qualifying dossier, and the completion and defense of a thesis project. A culture of rigorous scholarship and critical inquiry cultivated through faculty members’ vibrant research and research dissemination activities will also model a pedagogy of capability. We also seek to embed problem-based learning (PBL), one of McMaster’s signature pedagogies originally developed in the Medical program, as a core pedagogical framework in the program, and by extension, in the Humanities. The program’s foundation seminars will be oriented to a PBL approach such that students can begin to exercise multidisciplinary tools and thinking at the outset of their degree. We see PBL as a vital tool for the development of creative and critical thinking and learning demanded by study in the Humanities and by the complexity of the social and political problems of digital, networked society with which scholars in the program specifically must grapple.

3) **Interdisciplinarity**

   The origins of the proposal of a joint PhD program between the Departments of CSMM and ECS can be traced to the desire to foster interdisciplinarity and the cross-pollination of ideas and methods that interdisciplinarity thinking can effect among researchers and graduate students. *FWI* asserts that “a comprehensive approach to any problem must be, by definition, multidisciplinary.” We see this as an especially pressing concern for scholars in the Humanities who confront complex social and political problems in their research and work. The proposed program therefore seeks to equip students with the tools of at least two of its three constitutive fields to afford them the capacity to exceed the confines of narrow disciplinary thinking and instead approach complexity with a diverse and rich array of critical, conceptual, artistic, and technological skills. Each of the program’s fields shares a concern for understanding how complex relations of power structure the social and the cultural, and in so doing each reaches beyond their disciplinary bounds to address wider social and cultural problems. Core faculty in the proposed program are affiliated with a range of interdisciplinary centres and programs, including the Institute on Globalization and the Human Condition, the Sherman Centre for
Digital Scholarship, the McMaster Centre for Scholarship in the Public Interest, the Centre for Community-Engaged Narrative Arts, macGrid, and Gender Studies and Feminist Research. Students in the program will be mentored in a strongly interdisciplinary environment. As they develop advanced social, cultural, digital, and communication literacies in the program, students will master and synthesize the established disciplinary knowledges of communication, new media, and cultural studies, as well as learning to see themselves working at the intersections of the many transdisciplinary problems facing the contemporary world.

Community Engagement
Faculty members in ECS and CSMM have consistently taken their research and expertise to and learned from the community in a range of ways—in public lectures, serving as board members of professional and academic associations, volunteering, and activism. For a number of faculty, teaching, research, and community are inseparable: among others, Amber Dean works with downtown Hamilton LGBTQ and sex worker groups; Daniel Coleman and Lorraine York co-direct the new Centre for Community Engaged Narrative Arts; Liss Platt works with community organizations in Toronto and Saskatchewan and filmmakers, media artists, and scholars in her work in the Anti-Colonial Project; and Faiza Hirji volunteers with not-for-profit organizations developing communications materials.

Research
FWI underlines the impact McMaster’s researchers have had on the “physical, cultural and economic well being of the human community” and so acknowledges the necessary linkage between a commitment to community and research. This commitment to community is embedded in the proposed program’s focus on driving positive social change and is evidenced in the research of program faculty members whose work focuses on gender; sexuality; race; ethnicity; disability; the politics of performance; international policy; representation and visual culture; the intersection of digital and youth cultures; indigenous studies; postcolonial and diasporic studies; transnational culture and globalization; education and knowledge translation using virtual worlds; the synthesis of research, learning, and knowledge creation in the digital arts; critical environmental studies; and political economy. Just as FWI emphasizes the role graduate students play in advancing research at McMaster as a “student-centred research-intensive university,” so too do we recognize and foster graduate student success both in their capacities as researchers and learners.

Internationalization
The graduate programs in ECS and the MA in Communication and New Media in CSMM have been successful in attracting both domestic and international students to their programs. We foresee the proposed program garnering interest both at home and abroad, but as President Deane is careful to emphasize, both in his 2011 FWI letter and most recently in his 2014 letter, Global and Community Engagement at McMaster, we acknowledge that conceiving of internationalization with integrity means escaping a frame that measures the University’s success in this regard in terms of enrolment numbers and international student fees. As is the case in ECS and CSMM’s current graduate programs, the
student body will primarily comprise domestic applicants and occasionally exceptional international students when warranted. *FWI* advocates for adopting a "transformational model" of internationalization, one that acknowledges that "with meaningful internationalization will come far-reaching changes to McMaster itself," and this is the approach to internationalization that the proposed program espouses in its research and curriculum. ECS and CSMM have in many ways already embedded this transformational model into their programs, with faculty members engaged in international collaborations in their research and artistic output and specializing in imperial, colonial, and postcolonial studies, transnational and international communication and culture, international copyright law, and in the study of the media and cultural production of Britain and settler communities in Canada and abroad, North American Indigenous Peoples, China, South Asia, and Black and Asian diasporic communities. Course offerings and research within the program will therefore be truly global in scope.

### 1.4 & 1.5: Program Learning Outcomes & Degree-Level Expectations

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<th>PLOs</th>
<th>GDLEs</th>
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<td><em>Graduates of the program will demonstrate the ability to...</em></td>
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<tr>
<td>1. Describe and analyze the core literature, theories, and methods of the fields of communication, new media, and cultural studies; understand the resonances and differences between different approaches and disciplines of communication and cultural studies and new media; identify the historical development of these fields and characterize their ongoing evolution; and think in critical, creative, and reflexive ways about the production, representation, and consumption of culture, communication, and media as both shaped by and shaping historical, institutional, and political contexts.</td>
<td>Breadth &amp; Depth of Knowledge</td>
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<td>2. Formulate and carry out complex, advanced research in a specialized field; synthesize and apply a diversity of epistemological frameworks, methods (including research creation), and theories from communication, new media, and cultural studies, including those that may lie outside the traditional bounds of their specialized field; investigate digital and material archives; and consolidate analytical and critical thinking skills to disseminate and contribute to new knowledge through peer-reviewed publication and presentation.</td>
<td>Research &amp; Scholarship</td>
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<td>Apply knowledge of different cultural, media, digital and/or theoretical archives and tools in novel contexts to contribute to new and multidisciplinary engagement across the university in the creation, critique, and exploration of cultural objects; and theorize critical conceptualizations of how power, meaning, emotion, and/or identity operate in and through cultural and media objects and performance.</td>
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<td>3.</td>
<td>Design, implement, and manage large-scale and long-term projects autonomously and in collaboration; comprehend, assess, and orientate in new and emerging subject areas in research and professional fields; integrate an awareness of histories of oppression and discrimination into the ethical performance of their work; and recognize and engage with diverse perspectives through an awareness of the historical and global specificity that grounds differing epistemologies, methodologies, and ideologies.</td>
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<td>4.</td>
<td>Articulate complex concepts clearly in modes including, but not limited to, prose and speech; plan and structure an extended argument; translate research to non-specialized audiences; and apply advanced digital, social, and/or cultural literacies in the interpretation and creation of a variety of media.</td>
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<td>5.</td>
<td>Recognize the ways in which social, political, historical, and material contexts inevitably render knowledge specific, situated, contextual, and plural; identify power dynamics that privilege some knowledges while disavowing others; and value the complexity of differing and competing knowledge systems.</td>
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1.6: Demand for Program

1.6.1: Evidence of Societal/Labour Market Need

The PhD program in Communication, New Media, and Cultural Studies will equip its students with knowledge of, and the capacities to intervene in, the digitally-mediated world in which graduates will work and live upon graduation. Students enrolled in the program will benefit from the rich genealogy of theory and research of its three fields to develop the advanced cultural, social, and digital literacies necessary for active, thoughtful, and conscientious engagement in communities large and small,
professional and non-professional. Exposure to the diverse methodologies of the three fields, from textual analysis to quantitative methods to research creation, will afford students the research and critical thinking skills demanded by Canada’s growing knowledge-based economy and will develop students’ capacities as cultural makers and producers. The Organization for Economic Development (OECD) reports that among the unique skills doctorate-degree holders bring to the labour market, their research skills are the most valued.\textsuperscript{2} Graduates of the program will be equipped with skills that are in wide demand: advanced research skills appropriate for work in the policy, not-for-profit, private and education sectors; cultural, social, and digital literacies developed at the high level demanded by PhD study; knowledge of and ability to innovate in modes and methods of communication; and the capacity for analyzing and engaging complex systems and problems.

In particular, program graduates will be strongly situated to respond to the needs of the digital economy, which the Social Sciences and Humanities Research Council (SSHRC) has identified as one of its six future challenge areas.\textsuperscript{3} SSHRC advocates the integration of and adaption to digital technologies in Social Sciences and Humanities research in order to grasp “their ethical, environmental, economic, legal and social implications” and to understand “how the latest tools can be used to both answer and ask questions.”\textsuperscript{3} The program brings considerations of the social, ethical, environmental, and legal impact of new media and technologies on communication and culture to the fore, as evidenced by faculty members’ commitment to research in areas such as visual culture and dis/ability, culture and the environment, international copyright law, representations of race and ethnicity, Islam and media, popular music studies, interactive art, and more. Through coursework, comprehensive exams, and research, students will also develop a deep knowledge of the foundational theoretical perspectives of communication, new media, and cultural studies, which emphasize the mutually constitutive relationship between various forms of technology and the individual. Program graduates will be familiar with approaches to technology and culture that do not see either as simply products or tools, but as modes of critical inquiry and knowledge creation that complexly affect social relations.

Graduates from the program can look forward to working both within and outside of academia. The OECD reports that the current labour market places a sustained and “possibly increasing” premium on individuals holding a doctorate relative to other highly qualified individuals.\textsuperscript{4} Desjardins and King present a broad picture of labour market outcomes for doctorate-degree holders in the Humanities: 77% work in

\begin{footnotesize}
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\item[3] Ibid.
\end{itemize}
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educational services, 4% in professional, scientific, and technical services, 3% in public administration, and 2% in health care and social assistance.5,6 While both OECD and Statistics Canada data suggest that individuals holding a doctorate degree in the Humanities face higher rates of unemployment and part-time or precarious employment than those in other fields,7 the unique focus of the program on culture, communication, and new media will afford graduates a competitive capacity to question, experiment, innovate, and conduct research in the fields of education, communications and communications technology, arts and culture, and policy. In 2013, the Ontario government identified 11 priority industry sectors, two of which are prime sectors for degree-holders in communication, new media, and cultural studies: Information and Communications Technology, and the Entertainment and Creative Cluster.8

The growth of the communication and media sector in Canada and beyond has produced demand for individuals with a diverse and dynamic skill set in these areas. This boom has also sparked growth in cultural studies, communication, and new media research. The Conference Board of Canada reports that nearly 40% of doctoral degree holders in Canada are employed in the higher education sector, as full- or part-time university and college instructors, research and teaching assistants, or postdoctoral fellows.9 Communication Studies is a growing and dynamic academic field for which highly trained scholars are in demand, as reflected in U.S.-based academic job listings (which include positions outside the United States).10 Indeed, the largest number of listings for positions in the humanities and social sciences advertised in The Chronicle of Higher Education during 2013-14 were for jobs in Communication and Media Studies.11 The National Communication Association reports that the number of job listings for Communication positions has more than doubled between 2009 and 2014 (from 351 to 752 listings), with digital/emerging/new media as the most commonly requested specialty in 2014.12

An environmental scan of similar programs in Ontario provides a more precise view of employment prospects for the proposed program’s graduates. This scan suggests that graduates of the proposed program can expect to work in policy, media production and analysis, cultural production, creative industries, public, not-for-profit and education sectors.

6 This data is derived from the labour market outcomes of doctorate degree-holders two years after graduation.
7 See Aurin et al. (2013), and Desjardins & King (2011).
9 Munro (2015).
10 Similar information is not available for Canada-specific job listings.
http://jobtracker.chroniclevitae.com/disciplines/.
12 National Communication Association, “2014 Academic Job Listings in Communication Report” (Washington, D.C., 2015), http://www.natcom.org/uploadedFiles/More_Scholarly_Resources/2014%20Jobs%20Report(1).pdf. 43% of the listings were specifically for a tenure-track assistant professor; 27% were for non-tenure track positions.
The proposed program supports the professionalization needs of its students by integrating professionalization activities into the program design. In response to the increasing number of doctorate-degree holders who work outside of the academy after graduation, the Canadian Association for Graduate Studies (CAGS) notes that PhD graduates’ “ability to pursue the increasingly diverse range of career paths before them would be greatly enhanced through greater attention to professional/transferable skills.”\(^\text{13}\) This is echoed by Sekuler, Crow, and Annan, who state, “Universities should invest in graduate-focused career services, recognizing that the needs of graduate students, and particularly PhD students, differ significantly from the needs of undergraduates.”\(^\text{14}\) We are committed to responding to this call for focused attention on graduate student professionalization.

Professionalization is also critical for students pursuing academic career paths. The proposed program prepares students to be competitive in an academic hiring environment that expects a high degree of professional accomplishment for new hires. A recent study surveying doctoral alumni at an Ontario university found that participants “tended to indicate that presenting seminars or research presentations, writing a major paper or thesis, writing manuscripts for publication, preparing conference presentations, collaborating with faculty members and working as part of a collaborative team were the aspects of their graduate education that were most important in preparing them for their careers.”\(^\text{15}\) We recognize these aspects of a Humanities PhD as integral to what Paul Yachnin, co-author of the *White Paper on the Future of Graduate Training in the Humanities*, calls the “outward-facing” “public skills” that Humanities PhD training is able to uniquely offer its graduates.\(^\text{16}\) These public skills are the high-level capacities of critical literacy, creativity, and critique that are central to the proposed program and to students’ successful work in serving the public upon graduation. Recognizing the integral role coursework, comprehensive exams, and the thesis play in the development of these core scholarly and transferable professional capacities, we seek to enhance the development of these outcomes through the program’s required foundation seminars and qualifying dossier.

In CNMCS, academic and non-academic professionalization is not supplementary to the program, or a “voluntary” component that students are expected to undertake on their own time. Instead, professionalization is deemed to be core to a student’s development as a scholar and as an active participant in many areas of society, including the digital economy; as such, professionalization is core to the program’s curriculum. The foundation seminars will offer workshops and seminars on key aspects of academic and non-academic professionalization, including such topics as conference presentations,


\(^\text{16}\) Paul Yachnin, “Rethinking the Humanities PhD,” *University Affairs*, March 11, 2015.
collaboration, non-academic career development, peer review and publication, non-traditional modes of research dissemination, teaching, and conference planning, among others. These two 3-unit required courses, taken in years I and II of the program, provide support in the professional development of students in a sustained manner. The qualifying dossier, which must be completed by the time of degree completion, captures a student’s progress through the program in her/his/their professional development. A successfully completed dossier will include a variety of components, including a grant application, a conference paper or artist’s talk, a revised article submitted for peer review or an art piece submitted to a juried exhibition, a teaching philosophy statement and a syllabus, and an op-ed. Students will review and evaluate the components of their qualifying dossiers under the direction of their supervisory committees, again ensuring that sustained support is available to students as they progress through the degree. The foundation seminars and qualifying dossier are discussed in detail in Sections 3.2 Structure and Regulation and 4.2 Program Innovation.

In addition to these core components of the curriculum, students in CNMCS will have access to existing departmental and University initiatives that provide opportunities for the further development of administration, communication, collaboration, teaching, and research skills. Students will have opportunities to serve on department committees in ECS and CSMM as well as university-wide committees. The Lewis and Ruth Sherman Centre for Digital Scholarship offers regular workshops designed to introduce scholars to and enhance their skill sets in the methods of the Digital Humanities. Each month, the Sherman Centre Colloquium, to which graduate students may apply to present, gathers members of the McMaster community to hear a researcher discussing an aspect of their digital research. The McMaster Institute for Innovation and Excellence in Teaching and Learning (MIIETL) offers a graduate-level course on university teaching and learning (Education 750), as well as a workshop series that focuses on key scholarly themes in teaching and learning in higher education (Education 700). MIIETL also runs Education 650, a peer-evaluated teaching experience workshop, where graduate-student participants deliver short lessons, practice instructional skills, and give and receive feedback on their teaching. Completion of Education 750 is one of the optional components of the qualifying dossier for which students in the program may gain credit.

1.6. II Evidence of Student Demand

Our proposed program’s distinctive features, including its integration of Communication, Digital Media and Cultural Studies, its problem-based focus and emphasis on critical literacy in the pursuit of social justice will attract students from a number of provincial and national MA programs. Several universities in Southern Ontario offer MA degrees in the individual fields of communication, new media, cultural studies, or closely related fields, including Brock University (Popular Culture), Queen’s University (Cultural Studies), Western University (Media Studies), York University and Ryerson University (Communication and Culture), Trent University (Theory, Culture, Society), OCAD University (Digital Futures), the University of Toronto (Knowledge Media Design), and Wilfrid Laurier University
(Communication Studies, Cultural Analysis and Social Theory). It will also offer graduates of the Cultural Studies and Critical Theory (CSCT) and Communication and New Media (CNM) Master’s programs, housed in ECS and CSMM respectively, the chance to extend and deepen their research in a doctoral program. In addition to these programs, several unique MA programs in Southern Ontario are likely to generate interest in the proposed program: Communication and Social Justice at the University of Windsor, Social Justice and Community Engagement at Wilfrid Laurier (Brantford), and Social Justice and Equity Studies at Brock University. A few of these Universities offer PhDs in single areas: Trent and Queen’s both offer PhDs in Cultural Studies, Western has a PhD in Media Studies. The combined degree through York and Ryerson is a PhD in Communications and Culture.

As more college-level institutions require that instructors hold a PhD, the Master of Fine Arts degree (MFA) is no longer universally perceived to be sufficient as a terminal degree in artistic fields.²² We anticipate a growing demand for PhD programs that can offer research-inclined artistic practitioners the chance to gain this credential. While practice-based PhDs are common in the United Kingdom and Australia, they are relatively new in North America. McMaster is uniquely positioned to lead the way in offering a practice-based PhD option for research-inclined digital and new media artists.

Communication studies is a growing field both at the undergraduate and graduate level. This growth and the interdisciplinary focus of the program means that the PhD in CNMCS can anticipate sustained demand from students seeking to conduct advanced research that is responsive to the rise of the digital economy and new media. Surveys conducted by ECS and CSMM bear out this projection of demand. As part of the program development process, ECS and CSMM sought out feedback both from current graduate students and alumni of both departments’ MA programs and ECS’s PhD program. Responses to online surveys (see APPENDIX 4: Consultation & Survey Summaries (Alumni & Current Students)) circulated to current graduate-student and alumni email lists evidence strong support of and interest in the program, with approximately half of respondents (47.2% of current graduate students and 53.34% of alumni) indicating that they would apply to the PhD in CNMCS if they were or had been given the opportunity. Among the reasons cited for their interest in the program, the opportunities for interdisciplinary research, the advancement of digital and new media literacies, and the flexibility that this interdisciplinary training would afford graduates on the job market were emphasized. The Graduate Caucus of English & Cultural Studies has also signed a letter of support for the program (see APPENDIX 1: Letters of Support).

²² For a discussion of this trend, see: https://www.insidehighered.com/advice/2013/05/24/phd-challenges-mfa-requisite-degree-arts-professors-essay
1.6. III Justifiable Duplication

The PhD in Communication, New Media, and Cultural Studies is distinctive in its focus on the integration of the critical perspectives and practices of cultural, new media, and communication studies. The program’s critical interdisciplinarity will stress the capacities and limitations, connections and contradictions between the program’s disciplines, encouraging greater reflexivity about the institutional contexts of knowledge production and students’ own places within those contexts. Through coursework, students will develop capacities in at least two of the program’s three disciplines and in their critical integration (see Section 3.2 Structure and Regulation for further discussion of the program structure and coursework requirements). The foundation seminars and qualifying dossier incorporate professionalization, including a range of elements such as grant applications, publication/exhibition of work, and development of curricula, directly into the degree requirements (for further discussion of professionalization, see Section 1.6.1: Evidence of Societal/Labour Market Need). In addition to readying them for diverse job markets, these activities will help to prepare students for their final project, which may take the form of a traditional thesis, a sandwich thesis or a research creation (project-based) thesis.

Our review of graduate programs both nationally and internationally confirms that PhD programs that incorporate a similar interdisciplinary approach along with diverse paths to professionalization and degree completion are not common either in Canada or abroad. Several Canadian universities offer PhD degrees in Communications: Carleton, the University of Ottawa (new in 2015), Western (Media Studies), Concordia, McGill, the University of Calgary, and Simon Fraser University. Two offer PhDs in Cultural Studies: Trent University and Queens University. These programs offer a range of approaches: Queens offers a practicum thesis option, which can comprise a creative/cultural work or community work; Concordia’s Communication Studies PhD brings a media-arts oriented approach to their degree. The York-Ryerson joint program in Communication and Culture covers a wide range of topics across its two campuses. Students in the program choose a major and minor in two of three streams: Media & Culture, Politics & Policy, or Technology in Practice. Our proposed PhD in Communication, New Media, and Cultural Studies also offers students multiple paths, but with particular emphasis on the histories of, and confluences and constraints between, the disciplines that comprise the program. As well, the program’s modest size and closely situated facilities will encourage a close, inclusive cohort experience in which interdisciplinary relationships are both intellectually and physically present.

The option to pursue an artistic or research-creation project in fulfillment of the thesis requirement is relatively new in Canada. Only three other comparable programs in Canada (at York University, Queens University, and Western University) currently allow PhD students the option to pursue artistic projects as part of their degree requirements. The program’s attention to social justice and critical literacy—supported by the extensive faculty research and expertise in these areas—will extend to all students, including those pursuing creative projects. The research-creation undertaken by students in the proposed program will ensure that artistic work develops in conversation with wider socio-cultural literacies.
Please see APPENDIX 5: Environmental Scan for list of comparator programs in Canada and their associated tuition fees.

As discussed in Section 1.6.11 Evidence of Student Demand, the proposed program will offer a PhD option for students graduating out of several MA programs offered in Southern Ontario in the fields of communications, new media, digital media, and cultural studies. At McMaster, the proposed program will create a PhD option for graduates of the MA programs in Communication and New Media, and Critical Theory and Cultural Studies, thus filling a gap at the PhD level in terms of current graduate program offerings. Historically, the Department of English and Cultural Studies has attracted a number of PhD students each year interested in pursuing cultural studies research at the doctoral level. Some of these students would be served well by a degree option—both in terms of research and employability—that links cultural studies with communication and new media studies.

McMaster’s location in Hamilton also underscores the suitability of developing this program here and now. The city’s current strategic plan emphasises the ongoing development of the city as an innovative, prosperous, and healthy community.¹⁸ McMaster’s Innovation Park has already become the home for many non-profit groups aimed at facilitating the development of the city, for example, CoBALT connects: a group that focuses on both understanding the shifting urban landscape and creating connections between small businesses, community organizations, and those with the skills to assist these groups. As McMaster works to engage with other local actors in Hamilton’s path to redevelopment, students in this program will be well placed to participate in this process. The proposed program will both attract and foster students well-equipped to listen to community members and engage ethically with communities beyond the university. As well, the downtown core of Hamilton is currently the site of a flourishing and growing arts and culture community that provides many opportunities for engagement and in which many ECS and CSMM faculty members are already involved, for example, Liss Platt, David Ogborn, Sarah Brophy, Janice Hladki, and Daniel Coleman work closely with Hamilton artists, writers, and poets to exhibit and curate art and literary work in Hamilton. Artists and new media practitioners in the program will find many small galleries and exhibition spaces in which to screen and share work, offering another means by which to enrich local literacies and conversations around fundamental issues of social and civic justice.

¹⁸ City of Hamilton Strategic Plan: https://www.hamilton.ca/NR/rdonlyres/1E4996C7-2D9A-4B3B-89CB-4B044F828A9D/0/StrategicPlan20122015.pdf
1.7 Degree Nomenclature

Students completing this course of study will be awarded a PhD in Communication, New Media, and Cultural Studies. The degree nomenclature provides formal recognition of the interdisciplinary knowledge and work students in the program will develop and conduct, and so will provide an appropriate title for graduates in the program seeking academic employment.
ADMISSION & ENROLMENT

2.1 Admission Requirements

Since the standard graduate progression in the Humanities and the Social Sciences remains the completion of a Master’s degree before admission to the PhD, this new program will demand a completed MA, MSc, MFA, or Master’s of Communication Management (MCM) degree in a relevant field (e.g. communication studies, cultural studies, new media). Students with a Master’s degree in a related field (e.g. Sociology, Anthropology, Women’s Studies, English, Philosophy) who have focussed on research germane to the program will also be admissible. While students must have expertise in at least one of new media, communication, or cultural studies, the committee will look particularly favourably on students who have demonstrated fluency in two or more program areas.

McMaster University established the following general PhD admission requirements: “For applicants who hold a Master’s degree, the primary requirements are distinction in their previous graduate work (equivalent to at least a McMaster B+), and strong letters of reference.” For admission to the PhD in CNMCS, we will ask the following of applicants:

- Distinction in graduate work (equivalent to at least a McMaster A-): these scores establish the candidate’s ability to manage the level of critical discourse and productivity demanded by a PhD program.
- Two letters of reference: these ask for detailed commentary on the applicant’s intellectual ability, originality, oral and written communication, initiative and industry, and potential as a researcher and teacher.
- A research proposal of 500 words: we will look for promise of the ability to formulate an original research program, a grasp of appropriate methodologies, and strong, lucid writing. The admissions committee will be particularly receptive to proposals that create a dialogue between two or more of the areas covered by the degree.
- A sample of graduate-level work: 25 pages of critical/analytical scholarly writing, and/or a digital portfolio of creative work. Here we will seek evidence of the ability to sustain a convincing argument, marshal appropriate evidence, and exhibit methodological sophistication, or to display technical accomplishment and a high degree of creativity in creative practice.
- Since the language of instruction of the PhD will be English, students whose first language is not English must establish their proficiency through an international test at levels established by CNMCS: IELTS minimum score of 7 with a minimum score of 6 in each category; TOEFL of 100 (IBT, internet-based), 250 (computer-based), or 600 (paper-based).

These materials, taken together, provide ample evidence of each applicant’s competencies.
2.2 Enrolment Planning and Allocations

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<th>Students' Program Year</th>
<th>Yr 1: CNMCS Launch</th>
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<th>Launch + 2 Yr</th>
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<td>Total Enrolment</td>
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These enrolment plans meet the University's ongoing commitment to graduate expansion. The Strategic Mandate Agreement (SMA) projects considerable growth at the graduate level, from 955 full-time eligible PhDs in 2014-15 to 1,015 in 2016-17: a growth of 60 doctoral students in 3 years. The SMA further establishes that "The Ministry also agrees that McMaster will be given consideration for further space conversions, depending on targeted growth." The PhD in CNMCS will be an important part of the Faculty of Humanities' contribution to graduate growth within the University. The enrolment numbers given here are based on current faculty teaching and supervision resources. Increases in enrolment targets will be dependent on growth in tenure-stream faculty numbers and resources in the two home departments, CSMM and ECS.

2.3 Alternative Requirements: N/A
STRUCTURE

3.1 Administration, Governance, and Communication

*Administration and Governance:* The proposed program will be administered by co-directors from ECS and CSMM. These co-directors will be the same persons directing the Master of Arts degree programs in Communications and Multimedia and Cultural Studies and Critical Theory.

The program will be led by an Advisory Committee of five faculty members made up of: the co-directors, one appointee from each department, one appointee from outside the two departments, and one graduate student representative who will be elected from among the graduate student body in the proposed program. Each member of the committee will serve a one-year term, with the co-directors taking on a two-year term, in conjunction with their service as co-directors of the MA programs.

Administrative support will be provided for the proposed program by the Graduate Administrative Assistant in CSMM.

*Communication:* The Advisory Committee will meet twice per term and the co-directors will report annually to the chairs of each department (ECS and CSMM), as well as to the Associate Dean of Humanities, Graduate Studies and Research. The graduate student representative will communicate back to the student body on a regular basis through graduate student caucus meetings.

3.2 Structure and Regulation

**Program Structure Overview**

Students of the program must complete the following for successful degree completion:

- 18 units of approved coursework to be completed by the end of the second year, including:
  - 4 courses, for a total of 12 units, to be completed in year 1
  - two 3-unit foundation seminars, taken in year 1 and year 2
- Comprehensive exams
- A qualifying dossier
- A thesis

A detailed description of and rationale for each of these components follow below.
Program Curriculum

Coursework will prepare students for conducting independent study towards the completion of comprehensive exams and the thesis. Courses will not only train students in scholarship and methodologies from communication and cultural studies and new media, but will also cultivate their capacity to ask good research questions, work independently and collaboratively, design robust and creative solutions to problems, become familiar with a breadth of multidisciplinary tools and knowledges, and engage in scholarly dialogue. The foundation seminars, in years 1 and 2, will allow students to hone these capacities, and to cultivate professional skills.

Courses
Students will select courses from an approved list (see APPENDIX 6: Course Descriptions for a list of these courses and their calendar descriptions). Students can select graduate-level courses offered by CSM and ECS. We see the access students will have to a broad range of courses in ECS and CSM as one of the program’s core strengths, as the breadth of these multidisciplinary courses will provide the foundational knowledge of the core literature, theories, and methods of the fields of communication, new media, and cultural studies as well as opportunities to develop the critical thinking, writing, and presentation skills necessary for the interdisciplinary work demanded by the degree. All approved courses in the program are 700-level courses, which ensures that all program coursework will demand the highest level of academic rigour appropriate for PhD-level study.

Students may take 700-level courses from outside the supporting departments with the approval of both the course instructor and the program director. For example, PhD and MA students in both ECS and CSM can currently take courses offered by the Institute on Globalization and the Human Condition, and benefit from the increased flexibility this affords them to align their course-load with their research interests, as well as the opportunity to participate in the exchange of ideas and perspectives across disciplines.

Core Courses
At the discretion of the program’s Advisory Committee, those students lacking relevant experience in a minimum of two of the program’s three disciplines will be required to take 1-2 foundational theory and methodology courses offered by ECS (CSCT 718) or CSM (CSMM 700, 707 and/or CSMM 712). These are core courses in cultural theory, communication methods, communication theory and new media methods. All students may opt in to these courses, but only those without the requisite background will be directed to enrol by the Advisory Committee. We see this as a way to respond to the program’s commitment to the development of interdisciplinary skills and thinking in our students while maintaining flexibility in course offerings: students who come to the program with proven theoretical and methodological expertise will not be required to rehearse that knowledge unnecessarily, and regardless of prior preparation, all students will develop familiarity with core theoretical and methodological frameworks in at least two of the three areas.
Foundation seminars I and II: Problems in Communication, New Media and Cultural Studies

Also mandatory is the completion of two 3-unit foundation seminars, which will meet every other week through terms 1 and 2 in year 1, and approximately once a month in year 2. The foundation seminars will provide a vital intellectual meeting-place that will foster collegiality and the sharing of ideas, methods, and practices both within a cohort, which otherwise may not meet as a group in the program’s other courses, and across cohorts, as second- and upper-year students will present their research programs to the first-year cohort in the foundation seminars annually. Students will have opportunities to share and workshop their developing research program throughout first year in the lead up to the submission of their short thesis proposals in term 2, encouraging the creation of a community of ideas and discussion as well as the pursuit of individual projects. The foundation seminars will be evaluated on a pass/fail/pass with distinction (P/F/P+) basis.

The foundation seminars seek to align weekly topics and assignments with students’ needs as they progress through the program. In year 1, term 1, for example, sessions will engage such topics as the development of a research question, bibliography and database management, grant writing, peer evaluation and collaboration, and academic and non-academic career planning, among others. Faculty members and university staff will be asked to speak with or lead the class when their expertise is particularly relevant, and students will be asked to think through the challenges and complexity of conducting scholarship in an interdisciplinary field, and in their field of specialization more specifically. The foundation seminars will therefore encourage students to think critically and reflexively about their work as scholars, and will ask students to explore a number of pressing ethical, methodological, and theoretical questions in regards to their work. When developing a research question, for example, how might Humanities scholars think of their work as a response to a problem? How can scholars historicize problems? What does it mean to have “bibliographic control,” and how does one build a bibliography in an interdisciplinary field? What happens when a research project demands a shift from one methodology to a methodology that is new to the researcher? How does one negotiate interdisciplinary collaboration, and recognize the limits of one’s own disciplinary knowledge? How can the skills and knowledge bases developed through the program support one’s active engagement in society? What kind of role can scholars in Communication, New Media, and Cultural Studies have in community engagement initiatives?

The foundation seminars also seek to encourage students to explore the diverse tools and perspectives of the program’s three areas in a problem-driven approach to Humanities research that extends the "big problem" focus of the program’s orientation week into the program’s core curriculum. In term 2, seminars on dedicated topics will continue (such as attending conferences, community engagement, methodologies, etc.), but students will also plan a year-end symposium, organized around a central problem identified by students. This problem-based focus will bring the academic work and discussion conducted in the foundation seminars directly into conversation with the public sphere. Funding for the symposium will include an honorarium for a visiting scholar, who will be encouraged to attend the day-
long event, and students will present both their short thesis proposals as well as a conference paper in response to the symposium’s “big problem” topic. In this way, students will be encouraged to start thinking about the ways in which the tools of communication, new media, and cultural studies can be used to grapple with larger social challenges in their first year, and will continue developing critical and creative capacities in the application of these tools as they prepare for and engage with the visiting scholar.

In the second year of the foundation seminars, students will meet approximately once a month to guarantee adequate flexibility as they focus on comprehensive exams. This second year of the course allows students the opportunity to continue learning from one another and from established scholars as they workshop and revise conference presentations, thesis proposals, teaching philosophies, and prepare articles and arts and media projects for submission to peer-reviewed venues (e.g., a peer-reviewed journal or a peer-adjudicated public exhibition). Students in the second year of the foundation seminars will also present their work to first-year students both at the beginning of the year during orientation week and at its end, at the first-year symposium. These presentations will help build a sense of inter-cohort community, create an opportunity for second-year students to gain valuable feedback on their projects as they begin the work of developing their thesis in earnest, and offer first-year students models for crafting a more robust research project. (See Section 4.2 Program Innovation for more detail on the participation of upper-year students in the foundation seminars.)

Other Curriculum Components of the Program

Comprehensive Examination
Students in the proposed program will be required to take the Comprehensive Examination in the area of their intended thesis research. This will involve writing two papers, a Field Survey and a Topic Paper, and defending both in an oral examination. The Field Survey should show broad expertise in the wider field of knowledge the candidate’s research will engage in one or more of the disciplines of communication studies, cultural studies, or media arts. The Topic Paper describes how the candidate’s thesis intervenes in that field and the particular contribution it will make. Both papers are to be researched and written concurrently by the candidate, are to be between 25 and 30 double-spaced pages in length, and are due in February of the second year of study. The Oral Examination of both papers will follow within 10 days of submission. The candidate’s mark in the Comprehensive Examination will be calculated on the average of the grades for the Field Survey, the Topic Paper, and the oral examination.

Thesis
After the completion of the comprehensive examination, during the third and fourth year of the program, the candidate will complete a thesis, either a traditional thesis, a sandwich thesis, or a research-creation thesis. Students will defend their work at an oral examination at the end of the fourth
year. The candidate is expected to meet with his or her supervisory committee at least once a year. The thesis or research-creation project will be developed by the candidate in consultation with the supervisory committee. To summarize, the program will support the following pathways to degree completion:

- A **traditional thesis**, which will normally be between 200 and 250 pages (not including bibliography)
- A **research-creation or project-based thesis**, which will consist of a body of work and written commentary on that work of between 100 and 150 pages
- A **sandwich thesis**, which, in accordance with McMaster’s Thesis Preparation Guide, must consist of a minimum of three scholarly works on a unified theme, either previously published or exhibited, submitted for peer-review, or prepared for publication/exhibition but not yet submitted (in CNMCS, these works may include journal articles submitted for peer review, or art/media/performance pieces submitted for peer-adjudication); these works must be accompanied by substantial introductory and concluding chapters, addressing the methodologies, theories and approaches that unify and inform the research.\(^\text{19}\)

Portions of the student’s research will be presented to the supervisor for comment and approval before they are sent on to other members of the supervisory committee. Any substantive change in thesis topic or approach must be agreed to by the supervisory committee and endorsed by the Graduate Studies Committee, which will also make arrangements for changes in the supervisory committee when necessary.

**Qualifying Dossier**

Over the course of their graduate study, students in the program will develop a qualifying dossier, or a portfolio of student work that functions both as a narrative of a student’s development and as a vehicle for professional development and the assessment of a student’s progress through the program. The dossier will be reviewed by the student’s committee members a minimum of three times during a student’s tenure in the program (typically at the student’s annual committee meeting in years 2, 3, and 4) and the minimum requirements (described below) must be completed in order for a student to receive his/her/their degree. Through the dossier, students will document and reflect on their progress as teachers, thinkers, public scholars, and researchers.

The required components of the qualifying dossier are those upon which the workshops in years one and two of the foundation seminars focus. In total, students must complete:

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• a grant application;
• a conference paper or artist talk;
• a revision and submission of an article or artistic piece for peer-reviewed publication or juried exhibition;
• a syllabus and a teaching philosophy statement; and
• an op-ed or other knowledge translation project (e.g., a blog, performance, artwork, website, new media project, etc).

To be determined between the student and his/her/their supervisor, a qualifying dossier must also include at least two of the following:

• Education 750 (offered by the McMaster Institute for Innovation and Excellence in Teaching and Learning)
• Four written responses to talks given by visiting speakers
• Participation in four professionalization workshops (academic or non-academic), offered by ECS, CSMM, or the Faculty of Humanities
• App / game / multimedia project
• Book review / exhibition review
• Community-engagement project
• Guest lecture
• Digital Humanities project
• Conference organizing

Verification that Courses Included Meet University Requirements

The university does not have minimum numbers of required courses at the doctoral level. All eligible courses open to students in the proposed program are at the 700-level and thus meet the University’s standards for PhD-level courses, and all courses must be completed by the end of the second year of the program, in accordance with the University’s guidelines. The university requires PhD students to complete comprehensive exams, which are included as a requirement in the proposed program. The proposed program requires students to complete the comprehensive exam in the 18th month of the program, before the university’s upper limit of the 24th month.

The proposed program follows the standard progression of a four-year Humanities PhD at McMaster. In the first year, coursework situates students within the program’s core fields, allowing them to explore their interests and develop their research interests in conversation with their peers and in the larger context of their field(s). In the second year, preparation for the comprehensive exams allows students the opportunity to build a deep knowledge of their field(s), as expressed in the Field Paper, and to position their work as an original contribution to this field, as expressed in the Topic Paper. The oral defense at this stage allows students to develop a sense of themselves as scholars in conversation with
faculty and peers and affords students the opportunity to practice sustained, open-ended discussion and
debate in their scholarly fields. The thesis draws together this deep engagement with the field in a
project designed to push the boundaries of thinking and practice in their area of interest, allowing
students to participate actively in their field of research and/or practice; gain the deep, specialized
knowledge and critical methodological tools necessary for further research beyond the degree; and to
recognize the limits of that knowledge and expertise. The additional requirement of the qualifying
dossier will build students’ practical skills in their development as teachers, public intellectuals, and
creative researchers.

Course Calendar Descriptions

CNMCS PhD Foundation seminars I and II: Problems in Communication, New Media and Cultural Studies
The CNMCS foundation-seminars focus on questions of method, theory, and artistic approaches in the
context of an interdisciplinary program. They also support students in professionalization, the
research/creation process (especially in relation to the PhD thesis), and what it means to participate in
academic inquiry and community through the development of a symposium around a big problem facing
the Humanities. Specifically, our aims are to:
1) engage students in an ongoing conversation about method, theory, and artistic approaches in
   the context of an interdisciplinary program;
2) enable students’ participation in the intellectual community of the department, university, and
   beyond;
3) foster engagement with a diversity of professionalization skills and strategies; and
4) provide support during the proposal development and research/creation/writing phases of the
   first and second year of the PhD.

For course calendar descriptions of all current courses that will be included in the curriculum for the
proposed program, please see APPENDIX 6: Course Descriptions.

3.3 Program Length and Progression

As students enter the program, they will participate with upper-year students and faculty in a week-long
orientation to the program and its fields that will take the shape of engagement with a current problem
facing Humanities research in these areas.

In their first year, students will:
• fulfill course requirements for the PhD, including any foundational methods or theory courses
deemed necessary by the admissions committee, as well as Foundation seminar I;
• prepare grant applications, develop a research question, prepare a list of readings for the
comprehensive exam, and develop their short thesis proposal in Foundation seminar I;
• submit a short proposal for their PhD work and finalize their PhD supervisor and committee in term 2; and
• work with their supervisory committee to determine a list of material for the comprehensive exams.

In their second year, students will:
• complete the requirements of Foundation seminar II;
• review their progress in the completion of components of the qualifying dossier in their annual committee meeting;
• take their comprehensive exams in February, which will consist of two 30-page essays—a field paper and a topic paper—written by the student and orally defended to the student’s committee (see above);
• prepare a 10-15 page thesis proposal further detailing their project;
• present their long PhD proposals to the first year’s Foundation seminar I; and
• submit their long thesis proposal to a committee consisting of members of the program’s core faculty for approval in April.

The third and fourth years of the program are dedicated to the completion of the thesis and qualifying dossier, with regular meetings held between the student and his/her/their committee. Throughout the program, the committee will encourage students in the timely completion of qualifying dossier requirements (detailed above), offering feedback on the components and guiding the student in locating opportunities for dissemination, etc. Completion time for the PhD will normally be 48 months of full-time study.
CURRICULUM & TEACHING

4.1 Program Content

The program structure is designed to foster the ongoing lively, scholarly interaction integral to developing current and emerging knowledge in communication, new media, and cultural studies among its students. In particular, the following aspects of the program act both to ensure that students will encounter new knowledge and methods germane to the program’s three areas consistently throughout their degree, and to model the work of engagement with scholarly and social communities in critique, discussion, and research dissemination that the program seeks to engender.

- **Courses:** The courses available to students of CNMCS are all designed and led by active researchers who publish original scholarship in their respective fields (see the attached USB for faculty CVs). Faculty members in both CSMM and ECS consistently bring their research to their graduate courses, such that new research results in an iterative reshaping of graduate course syllabi. The foundation seminars will involve a diversity of faculty presenting and discussing a range of research, research-creation, and artistic methods, theories, and approaches, as well as presentations by second-year students in the program, which will establish an ongoing process of knowledge exchange among students.

- **Visiting Speakers:** The Departments of CSMM and ECS each run highly successful and vibrant student-led Visiting Speakers Series. Students in CNMCS will have the opportunity to sit on organizing committees for the each Department’s series, and all students will be encouraged to attend talks, through which they will interact with distinguished scholars in communication, new media, and/or cultural studies whose work is at the forefront of their field. All visiting scholars give a public presentation, and a less formal seminar and/ or meal is arranged at which the program’s graduate students can make personal contact with these internationally recognized scholars to discuss their work.

- **The McMaster Centre for Scholarship in the Public Interest (MCSPI) Speakers Series:** Students in the proposed program will also have access to MCSPI’s annual speakers series, which brings internationally distinguished scholars to Hamilton to share their work on issues related to social justice, globalization, and critical pedagogy. In recent years, MCSPI has supported lectures by Angela Davis (2013), Dorothy Roberts (2014), Michael Hardt (2014), and Sut Jhally (2015), among others.

- **Hooker Fellows and Whidden Lecturers:** The two Departments will make regular joint applications to host visiting scholars within the University’s Harry Lyman Hooker Distinguished Professor Program. There is already a strong history of outstanding Hooker Fellows in the fields of CNMCS: Antonio Negri (2005), Rita Felski (2005), Stanley Aronowitz (2006), Sander Gilman (2008), Taiaiake Alfred (2008), Cressida Heyes (2012), Angela McRobbie (2012), and Chandra Mohanty (2013). ECS has also had great success in hosting the University’s Whidden lecturer:
speakers in the last several years have included Donna J. Haraway (2005), Brian Massumi (2006), Mervyn Morris (2007), Mahmood Mamdani (2008), Sarah Ahmed (2011), and Jasbir Puar (2013).

- **Thesis Proposals and Supervision:** The short thesis proposal, due for review by the Advisory Committee in the second term of a student’s first year, and the long thesis proposal, due for review in April of a student’s second year, will ensure that students receive timely feedback on the quality and currency of their research agendas. Regularly scheduled supervisory committee meetings will give students and faculty the opportunity to evaluate the progress of research programs.

### 4.2 Program Innovation

The 2013 *White Paper on the Future of the PhD in the Humanities* advises that “new PhD programs should be reoriented toward active participation in the world, should promote collaborative and interdisciplinary research, and should develop new kinds of teaching, research, and research deliverables— websites, film, editions, translations, and so on, in addition to books and articles.” We see a PhD in Communication, New Media, and Cultural Studies as a pathway to the development of the research and research dissemination skills, critical literacies, creative capacities, and ethical and historical sensitivities required for active, outward engagement in the digital economy. CNMCS incorporates a number of innovations in its coursework, professional development components, and thesis requirement in order to support the development of these capacities.

The program’s innovative adaptation of problem-based learning, traditionally a health sciences pedagogical method, will be established in the introductory week of the program through day-long “intensives” focused on problem-solving activities, and will be carried forward in the first and second year through the foundation seminars and the annual symposium, as described in detail in Section 3.2 Structure and Regulation. This problem-driven curriculum provides a basis for students to begin to develop the capacity to formally and systematically evaluate and apply the tools of the Humanities to their research and to the complex problems facing modern Canada.

The major innovations of the program lie in its approach to degree completion: its multiple thesis options and the qualifying dossier. Both program components are designed to afford students maximum flexibility in the development of academic and professional skills, and the opportunity to experiment with, learn from, and advance research and research-creation methods in their fields.

The program’s three pathways to degree completion—the traditional thesis, research-creation thesis, or the sandwich thesis—will facilitate the practice of non-traditional research and research-creation.

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20 *White Paper on the Future of the PhD in the Humanities.* (Institute for the Public Life of Arts and Ideas: McGill University, December 2013), 1.
methods. The research-creation thesis option, which will see the development of rigorously theorized media arts projects, and the sandwich thesis option, a modular approach to the thesis that involves written components that have already been published and components that are under review alongside related presentations, performances, and smaller-scale media arts projects, will create opportunities for students to theorize and articulate the complex connections between arts and theory, communication and culture, and more. The qualifying dossier will contain five mandatory components that will foster the development of advanced research and research dissemination skills, as well as a minimum of two components (as established by the student in conversation with his/her/their committee) that reflect skills appropriate to a student’s own goals. The qualifying dossier will thereby afford all students, regardless of the thesis option they choose, the opportunity to explore non-traditional research and knowledge translation methods, as well as different forms of professional development.

4.3 Modes of Delivery

The primary mode of delivery is the graduate seminar where students will complete weekly reading assignments in preparation for participation in a focused discussion. Alongside written texts, students in many courses will be asked to critically “read” film, television, artwork, and performances. The McMaster Museum of Art has also indicated strong interest in supporting the integration of the work of the Museum in graduate courses in the program (see APPENDIX 1: Letters of Support). Instructors may choose to assess students’ participation in class, and may also choose to assign response papers and presentations throughout the semester. It is typical for instructors to assign a final research paper, or a final research or media arts project (e.g., a short film; the development and facilitation of a workshop; a musical, arts, or live-coding performance; an activist intervention; etc.), at the end of term. At the beginning of each semester, instructors will distribute a course outline specifying course learning objectives, expectations regarding student work and participation, and methods of evaluation. Instructors may supplement in-class discussion and participation with online teaching and learning opportunities. By encouraging discursive interaction among students and faculty, the seminar format enables students to teach and learn from one another, challenge one another’s perspectives, and collaborate in the inquiry process. In the graduate seminar, the instructor acts more as a facilitator and guide who works to establish an environment in which students can enhance conceptual, critical, and communication abilities demanded by advanced research that contributes in original and innovative ways to scholarly knowledge.

Students may register in ECS and CSMM’s graduate courses, which are capped at 15 students, but typically average 12, and which meet once a week for three hours. These relatively small group meetings are a highly effective way of nurturing a critical, multidisciplinary perspective appropriate for doctoral study by fostering lively interdisciplinary interaction and the exchange of knowledge across different peer groups. Because graduate courses in both ECS and CSMM are open to both MA and PhD students, students in the CNMCS PhD will benefit from taking classes alongside MA and PhD students in different
programs (e.g., English, Cultural Studies and Critical Theory, Communication and New Media, as well as programs outside of ECS and CSMM). ECS has a long track record of opening its graduate courses to all of its graduate students: all graduate-level ECS courses are open to both MA and PhD students in the department, and this practice has met with great success, productively challenging MA students in their coursework and seminar discussions, and maximizing flexibility and breadth in course offerings for all graduate students in the department. Similarly, both the CSCT and CNM MA programs have successfully opened their courses to students in both programs. Students in the CSCT MA may enrol in courses offered in the CNM MA and vice-versa, and those students who have opted to do so have benefited from the interdisciplinary conversations these classroom settings provide.

Supplementing the seminar mode of delivery is the problem-driven pedagogy incorporated in the “intensives” undertaken in the first week of the program and carried forward in the foundation seminars. This PBL approach will help to foster independent and cooperative problem-solving skills. The foundation seminars will include a variety of different formats, including seminars, faculty and student-run panel discussions, and workshops. Since only CNMCS students can enrol in the foundation seminars, its small size will afford each student the opportunity to fully engage with his/her/their peers, the instructor, and visiting speakers and facilitators.

The goal of courses undertaken in first year will be to prepare students to work independently in years 2-4 of the program, with mentorship by supervisory committees continuing throughout the program.

4.4 Experiential Learning

Students in the program will have opportunities to participate in existing departmental and faculty initiatives. Research Assistantships associated with the diverse research and artistic projects led by the program’s core faculty will furnish opportunities for experiential learning in CNMCS. Recent projects include, among others, Sarah Brophy and Janice Hladki’s Forward with Integrity-funded investigation of museology as research and pedagogy through the curation of an exhibition at the McMaster Museum of Art titled, This is Me. This is Also Me, which involved experiential community- and student-centred activities to enhance the impact of the exhibition’s research contributions; David Ogborn’s Arts Research Board-funded project, “Live Coding and the Challenges of Digital Society,” which supports live coding performance; Sara Bannerman’s SSHRC Insight Development Grant-funded research on international copyright law; and David Harris Smith’s SSHRC Partnership Development Grant-funded digital storytelling project that promotes Hamilton culture and identity by collecting and sharing digital stories, photographs, maps, archival material, and more, and the macGRID Simulation Research Network and Platform, of which he is Director. Section 1.3: Consistency with McMaster’s Mission and Academic Plan discusses in detail the collaborative research opportunities on-campus units and research initiatives (including the Museum of Art, macGRID, and the Sherman Centre for Digital Scholarship) can provide students in the program; the directors of the Centre for Community-Engaged Narrative Arts and the
McMaster Centre for Scholarship in the Public Interest have also indicated their support of the involvement of the program’s graduate students in their initiatives (see APPENDIX 1: Letters of Support for letters of support).

4.5 Accessibility

The Departments of CSMM and ECS are strongly committed to accessibility, and we seek to prevent, identify, and remove barriers that students with disabilities may face in all of the Departments’ programming. In accordance with the Ontario Human Rights Code and McMaster’s accessibility policy, program directors and faculty will provide academic accommodations for students with disabilities, and will refer students to the appropriate campus unit, such as the Student Accessibility Services, when necessary. As part of TA training, students in the program will take an AODA training module, required for McMaster University employees.

4.6 Research Requirements

The major research requirement for the degree is the thesis, which remains the most effective way of nurturing the acquisition of specialized knowledge, an awareness of the limits and situatedness of that knowledge, and the advanced research skills necessary to mount compelling, unique research projects in a field. In CNMCS, these skills include the ability to synthesize and apply diverse epistemological frameworks, methods, and theories from communication studies, new media studies, and cultural studies; the capacity for autonomy in the design, implementation, and management of a large-scale and long-term project; the ability to comprehend, assess, and orientate in new and emerging subject areas; the ability to understand the historical development of a field; the ability to integrate an awareness of histories of oppression and discrimination into research and written work; the ability to articulate complex concepts clearly and structure an extended argument; and the ability to think in critical, creative, and reflexive ways about the production, representation, and consumption of culture, communication, and media as both shaped by and shaping historical, institutional, and political contexts.

The three thesis options, described in Section 3.2 Structure and Regulation, are suitable for this interdisciplinary program as they afford students with diverse artistic and research backgrounds flexibility in the design of their research programs. All three forms that the thesis may take (a traditional thesis, a research-creation thesis, and a sandwich thesis) involve rigorous written work, and will be developed by the candidate in consultation with the supervisory committee to ensure the highest level of scholarly engagement. The thesis will normally be defended at an oral examination at the end of the fourth year.
ASSESSMENT OF LEARNING

5.1 Methods for Assessing Students

There are various stages of formal assessment that unfold over the course of the proposed 4-year PhD program: coursework, the foundation seminars, comprehensive examinations, the qualifying dossier, and the thesis (including the short and long proposal).

*Foundation seminars I and II: Problems in Communication, New Media and Cultural Studies*

The foundation seminars are mandatory 3-unit courses that will be led by one or both of the program’s co-directors, who will maintain a record of student attendance at and participation in these classes and workshops. The course will be assessed on a pass/fail/pass with distinction (P/F/P+) basis. More than one absence per term will constitute grounds for a failing grade, at the discretion of the program’s co-directors. Many of the workshops in the foundation seminars offer background to the assignments required by the qualifying portfolio, which will be assessed separately by the student’s committee (see below).

*Graduate Coursework*

In addition to the foundation seminars, students will take courses totalling 12 units, encouraging a broad range of study across at least two of the program’s three core fields. Efforts in coursework will be assessed by course instructors using a variety of graded tools. All courses demand a longer, independently produced research essay (12-20 pages) or in-depth research-creation project, which can include several graded components (essay/project proposal, annotated bibliography, workshop, etc.). Final course projects and papers are assessed for their level of critical engagement, breadth of knowledge demonstrated, grasp of the theoretical stakes of a line of argumentation or research, sophistication of methodology, originality of argument, and lucidity and concision of expression or method. Graduate classes also often require students to present work orally to the class in the form of seminars, either individually or in groups. Seminar assignments permit assessment of the skills of oral presentation, research dissemination, and discussion facilitation. In seminar presentations, students are assessed on their ability to cogently and coherently summarize material for the class, engage the class in meaningful discussion, and present original research material in a compelling and accessible manner. Course instructors may also require students to submit additional material for assessment, including reading responses, peer evaluations, or participation assignments, such as online discussion boards or course websites/blogs.

*Comprehensive Examinations*

In winter of year 2 of the program, the completed Field and Topic Papers are examined by a committee of three faculty members and orally defended by the candidate. The committee assesses both the written and oral examination as: fail, pass, or pass with distinction. The aim of the comprehensive examination is to ensure that students attain both a specialized knowledge in their specific area of
expertise and a broader knowledge of the existing critical conversation in their field(s). Further, the examination determines that the student has the necessary professional skills to carry out cultural and media research at an advanced level, assemble a coherent set of texts for a course syllabus, and participate in sustained discussion and analysis of a specialized field. To successfully pass the comprehensive examination, students must demonstrate, both in their written papers and their oral defense, a significant scholarly maturity and a flexibility of thought and critical circumspection.

**Qualifying Dossier**

At the annual review meeting at the end of a student’s second, third year, and fourth years, the supervisory committee will review the components of her/his/their qualifying dossier. The dossier will be assessed as either fail, pass, or pass with distinction. In annual meetings in year 2 and 3, the dossier will be discussed among the committee and the student, with final evaluation occurring in year 4. Various workshops included in the foundation seminars will assist students in preparing and revising the components required by the qualifying dossier. To ensure a passing grade, students must complete the required components to a professional standard acceptable in their field and demonstrate their readiness to participate in the variety of professional capacities associated with dossier requirements. To receive a grade of distinction, which is awarded at the discretion of the supervisory committee, a student must complete the required components to an exceptional level, which could include achieving publication or public dissemination of their work, offering innovative approaches that exceed typical professional expectations, or otherwise going beyond their committee’s expectations.

**Thesis**

The thesis is the capstone assessment of the program. Its assessment begins with the submission of the short proposal in term 2 of year 1 of the program. The short proposal is either approved or sent back to the student for additional revision by the program’s 5-person Advisory Committee, which is made up of: the program’s two co-directors, one additional member from both ECS and CSMM, and one person from outside the department. In year 2 of the program, the student submits a long (10-15 page) thesis proposal further outlining their research question and approach. This proposal is also assessed by the Advisory Committee described above and either approved or returned to the student for further revision. When the long proposal is approved, the student begins work on the thesis. The completed thesis goes forward to defense when each of the three faculty members on the student’s committee deem it ready to be evaluated. The thesis is then submitted to a reviewer external to the university, who writes a report assessing the thesis project on the grounds of: its contribution to knowledge (originality, quality, quantity), research (adequacy, thoroughness), understanding of the subject (review of previous work, choice of project, evaluation of results, validity of conclusions), presentation (organization, grammar, style, bibliography), and overall quality. If the external examiner deems the work satisfactory, the project goes forward to an oral defense at which the candidate is questioned about his/her/their work for two hours. To pass, the student must demonstrate, both in the project and in the defense, all of the program learning outcomes for the PhD: an in-depth intellectual engagement with a scholarly or artistic field; a demonstrable ability to stay current on research in the field; the ability to carry out
insightful, rigorous, and original research or research-creation; an appreciation of the complexities and limitations of knowledge; the intellectual independence and initiative to plan and accomplish a long-term research project; the ability to communicate one’s research; the ability to produce original, sophisticated, convincing work of a quality to satisfy peer-review.

5.2 Curriculum Map

<table>
<thead>
<tr>
<th>PLOs</th>
<th>PhD DLEs</th>
<th>Teaching Activities and Learning Opportunities</th>
<th>Assessments and Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,2,3,6</td>
<td><strong>Formal:</strong> Core course(s); elective courses; comprehensive exams (particularly field paper); thesis (including short and long proposal) <strong>Informal:</strong> orientation week problem-solving activities; first year symposium; in-class discussion</td>
<td><strong>Assessments:</strong> Formal essay and project assignments; graded course work; comprehensive exam defense; dissertation defense; annual committee meetings <strong>Evidence:</strong> During formal assessments, like an oral defense, students will demonstrate a thorough knowledge of their field.</td>
</tr>
<tr>
<td>2</td>
<td>1,2</td>
<td><strong>Formal:</strong> Dissertation project; comprehensive exams (particularly topic paper), foundation seminars (research question development, bibliography/research approaches, conference proposal, and paper workshops) <strong>Informal:</strong> research assistantships with faculty projects; first-year symposium; engagement with Sherman Centre, McMaster Museum of Art, macGRID, etc.</td>
<td><strong>Assessments:</strong> Formal essay and project assignments; dissertation defense; comprehensive exam defense <strong>Evidence:</strong> In formal and informal program settings, students will demonstrate a grasp of the complexities of their field and will find success in external publication and presentation opportunities.</td>
</tr>
<tr>
<td>3</td>
<td>2,3,4,5</td>
<td><strong>Formal:</strong> Qualifying dossier (knowledge translation); foundation seminars (peer evaluation, collaborative project/research, symposium, knowledge translation training/workshops, community engagement workshop) <strong>Informal:</strong> participation in research clusters and projects ongoing among core faculty members; engagement with Sherman Centre, McMaster Museum of Art, macGRID, etc.</td>
<td><strong>Assessments:</strong> Thesis; comprehensive exams; qualifying dossier. <strong>Evidence:</strong> Vibrant participation by graduate students in the program across the university and in the wider community</td>
</tr>
<tr>
<td>4</td>
<td>2,4,5</td>
<td><strong>Formal:</strong> Qualifying dossier (teaching philosophy,</td>
<td><strong>Assessments:</strong> Thesis; graded</td>
</tr>
</tbody>
</table>
| 5 | 4,5 | **Formal:** Qualifying dossier (in particular the conference paper/artist talk and knowledge translation requirements); foundation seminars (3-minute thesis presentation, conference paper workshop, grant-writing, symposium, community engagement workshop)  
**Informal:** Conference presentations and performances among students; public exhibitions; knowledge translation in the wider community (blogs, op-eds, etc); publicly accessible projects | **Assessments:** Thesis defense; comprehensive examination; qualifying dossier; foundation seminars  
**Evidence:** Students in the program will participate in conferences, public performances, exhibitions and will publish, disseminate, and exhibit their work widely in both academic and non-academic contexts. |
| 6 | 1,2,3,6 | **Formal:** Thesis (including short and long proposals), course work, qualifying dossier (in particular the grant proposal requirement)  
**Informal:** in-class discussion; orientation week problem-solving activities; | **Assessments:** Thesis proposals and defense; comprehensive examination; coursework.  
**Evidence:** Students will understand the context and consequences of knowledge work both at an intellectual and a community level. |

### 5.3 Demonstrating Student Achievement

This program seeks to engage students deeply in a constellation of fields situated at the core of the public Humanities in Canada and develop the skills that are foundational to engaged citizenship: a deep awareness of the social, cultural, and historical complexity of the current moment, and the technical and critical ability to meaningfully intervene in public conversation and problem-solving. These are difficult skills to measure, but the proposed program includes several metrics for demonstrating achievement in these areas.
Success in the program will be defined by a mastery of interdisciplinary knowledge and a demonstrated ability to meaningfully engage in a range of problem-solving activities central to thinking in communications, new media, and cultural studies. These are assessed both through specific assignments (essays, projects, comprehensive exam, thesis, etc.) and through concrete steps taken towards professionalization (the qualifying dossier and foundation seminars). As part of the annual supervisory committee review, students will be asked to complete a self-assessment, reflecting on their intellectual and professional growth through the past year, setting goals for the coming year, and creating, with input from their committee, a plan to reach their overall professional goals by the end of the program. The qualifying dossier is an innovative pedagogical tool meant to formalize a student’s unique career path and planning, offering guidance in the development of the professional skills most valuable to the student’s goals and objectives. A second innovation of the program, the foundation seminars, provide scaffolding for all students in the program in terms of developing a rich set of professional skills applicable both to work inside the university and in the broader Canadian community. The assessment of both the qualifying dossier and the foundation seminars take the form of a dialogue between a student and his/her/their committee and one or both of the co-directors in the program, respectively. In this way, the program emphasizes assessment as a mutually determined relationship focused on positive personal growth and mentorship. Thus, the program seeks to enhance a narrow focus on numerical grades with a wider focus on personal development in conversation with a community of peers.

Underscored by a focus on mentorship and collaborative development, the overall success of the program will be reflected in students’ activities in the public sphere: offering conference papers, mounting gallery shows or performances, engaging in community-based projects, publishing work in academic and non-academic venues, securing external funding, etc. All of these will be tracked by the co-directors of the program in cooperation with supervisory committees and reported at Advisory Committee meetings.

The success of the proposed program will also be evaluated by students themselves through exit surveys upon degree completion and annual surveys initiated by the Graduate Student Caucus. Further, the formal IQAP cyclical program review process will offer a detailed reflection on the success of the program.

Students will demonstrate:
- breadth and depth of knowledge of both content and methodology in two or more fields of communication and cultural studies and new media;
- awareness of the history of the fields;
- the ability to engage constructively and critically with extant scholarship in their chosen areas of work;
- the ability to design and execute an original project that advances scholarly and/or artistic conversations in one or more of these areas;
- recognition of the limits of their disciplinary and personal perspectives and the curiosity and determination to try new approaches and pursue different knowledges;
- strong communication skills, including the ability to lead and participate in dialogue in different venues including seminars, workshops, charrettes, formal presentations; and
- success in disseminating their research in an array of different outlets (e.g. conferences, scholarly and/or creative publications in peer-reviewed publications, exhibitions)

The program will determine student success based on this definition in the following ways:
- The comprehensive exams will provide evidence of engagement with history and current problems in the field
- Qualifying dossier elements such as conference papers and publications will provide evidence of research dissemination and professional development
- The thesis, which will be the primary method of evaluating students’ success in meeting many of these criteria, will provide evidence of a student’s knowledge of the field, the ability to devise and engage with a research problem, the capacity to engage in creative thinking, and the ability to write clear, cogent arguments.
RESOURCES

6.2 Resources: Graduate Programs

6.2.I: Administrative, Physical, and Financial Resources

- Administrative support for the proposed program will be provided by the Graduate Administrative Assistant in CSMM.
- Existing or allocated seminar rooms (in Chester New Hall or Wilson Hall) will be used for courses offered as part of the proposed program. Many courses will also be cross-listed with other departments and programs, in which case, those departments will provide seminar rooms.
- Office space for PhD students in the proposed program will be provided either in new graduate office spaces in Wilson Hall or in space vacated by other programs moving to the new spaces in Wilson Hall.
- Students in the proposed program will have access to the graduate student lounge in ECS and a shared graduate student office in CSMM, both of which include shared computers and a printer.

6.2.II: Library, Technology, and Laboratory Resources

- Students in the proposed program will be able to sign out existing technology and equipment available in CSMM on an as-needed basis.

Students in the proposed program will also have access to the computing equipment and lab space in Togo Salmon Hall managed by Humanities Media and Computing (HMC), including the Anne and Neil McArthur Multimedia Wing, the Active Learning Lab, and the Open Access Computing Lab. For a detailed account of available equipment, see HMC's letter of support in

- APPENDIX 1: Letters of Support.
- All McMaster students are provided a MacID, which gives access to McMaster’s email facilities, on-campus wifi internet access, all “open-access” labs, university libraries, and various productivity software packages.
- See the attached Library Report for information on library resources and support (APPENDIX 2: Library Report).

Students in the program can apply for a Graduate Research Fellowship with the Lewis and Ruth Sherman Centre for Digital Scholarship. Fellowships are awarded annually and provide a stipend, cubicle space, and easy access to Sherman Centre staff. Research Fellows have input into Sherman Centre programming, access to guest speakers, and opportunities to present their work on the Sherman Centre website and at the Colloquium. Graduate student researchers and postdoctoral fellows may also be
granted non-stipendary research fellowships, which provide a Sherman Centre cubicle, input into programming and access to staff and speakers, and opportunities to present their work. (See letter of support from the Sherman Centre detailing opportunities for graduate student engagement with the Centre in

- APPENDIX 1: Letters of Support.)

6.2.III: Faculty

**Core Faculty in the PhD in Communication Studies, New Media and Cultural Studies by Department**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nadine Attewell</td>
<td>Associate Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Christina Baade</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Sara Bannerman</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Sarah Brophy</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Daniel Coleman</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Amber Dean</td>
<td>Assistant Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Terry Flynn</td>
<td>Assistant Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Henry Giroux</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Susan Searsl Giroux</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Paula Gardner</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Catherine Graham</td>
<td>Associate Professor</td>
<td>School of the Arts</td>
</tr>
<tr>
<td>Donald Goellnicht</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Robert Hamilton</td>
<td>Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Faiza Hirji</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Janice Hladki</td>
<td>Associate Professor</td>
<td>School of the Arts</td>
</tr>
<tr>
<td>Andrew MacLachlan</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Susie O'Brien</td>
<td>Associate Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Mary O'Connor</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>David Ogborne</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Liss Platt</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Christine Quail</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Anne Savage</td>
<td>Associate Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Philip Savage</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Alex Sevigny</td>
<td>Associate Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>David Harris Smith</td>
<td>Assistant Professor</td>
<td>Communication Studies and Multimedia</td>
</tr>
<tr>
<td>Lorraine York</td>
<td>Professor</td>
<td>English and Cultural Studies</td>
</tr>
<tr>
<td>Gena Zuroski Jenkins</td>
<td>Associate Professor</td>
<td>English and Cultural Studies</td>
</tr>
</tbody>
</table>
Faculty in the PhD in Communication Studies, New Media and Cultural Studies by Field

Communication Studies
Christina Baade, Associate Professor (1.0) Communication Studies and Multimedia
Sara Bannerman, Associate Professor (1.0) Communication Studies and Multimedia
Terry Flynn, Assistant Professor (1.0) Communication Studies and Multimedia
Faiza Hirji, Associate Professor (1.0) Communication Studies and Multimedia
Gardner, Paula, Associate Professor (1.0) Communication Studies and Multimedia
Christine Quail, Associate Professor (1.0) Communication Studies and Multimedia
Philip Savage, Associate Professor (1.0) Communication Studies and Multimedia
Alex Sevigny, Associate Professor (1.0) Communication Studies and Multimedia

New Media
Robert Hamilton, Professor (1.0) Communication Studies and Multimedia
Andrew Mactavish, Associate Professor (1.0) Communication Studies and Multimedia
David Ogborn, Associate Professor (1.0) Communication Studies and Multimedia
Liss Platt, Associate Professor (1.0) Communication Studies and Multimedia
David Harris Smith, Assistant Professor (1.0) Communication Studies and Multimedia

Cultural Studies
Nadine Attewell, Associate Professor (1.0) English and Cultural Studies
Sarah Brophy, Professor (1.0) English and Cultural Studies
Daniel Coleman, Professor (1.0) English and Cultural Studies
Amber Dean, Assistant Professor (1.0) English and Cultural Studies
Henry Giroux, Professor (1.0) English and Cultural Studies
Susan Searls Giroux, Professor (1.0) English and Cultural Studies
Catherine Graham, Associate Professor (1.0) School of the Arts
Donald Goellnicht, Professor (1.0) English and Cultural Studies
Janice Hladki, Associate Professor (1.0) School of the Arts
Susie O’Brien, Associate Professor (1.0) English and Cultural Studies
Mary O’Connor, Professor (1.0) English and Cultural Studies
Anne Savage, Associate Professor (1.0) English and Cultural Studies
Lorraine York, Professor (1.0) English and Cultural Studies
Gena Zuroski Jenkins, Associate Professor (1.0) English and Cultural Studies

- Core faculty in the proposed program are active researchers in their fields, publishing cutting edge research in leading journals, exhibiting in major gallery spaces, and collaborating with or creating leading research in communications, new media and cultural studies.
• For a full list of core faculty publications, exhibitions, artistic output and research creation, see APPENDIX 8: Faculty Publications.
• For a full overview of faculty excellence, please see attached CVs (included on USB)

6.2.IV: Student Financial Support

• The proposed program will provide students with scholarship and TAships at the minimum level of $17,500. However, given the track record of existing PhD students in English and Cultural Studies in receiving external funding (see APPENDIX 7: History of Graduate Student Scholarships & Awards), we expect external funding in the proposed program that will allow a distribution of this funding up to approximately $20,000 per student.
• Additionally, faculty in both departments have external grant funds that can be redistributed to graduate students through faculty member-funded RAships. (See chart in Section 6.2.V: Faculty Research Funding for a full breakdown of faculty research funding.)

6.2.V: Faculty Research Funding

<table>
<thead>
<tr>
<th>Year</th>
<th>Source</th>
<th>Major Equipment</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Granting Councils(^{21})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Peer Adjudicated(^{22})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contracts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other(^{23})</td>
<td></td>
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</tbody>
</table>

\(^{21}\) Does not include equipment grants, conference grants, or grants allocated by the university such as SSHRC minor grants.

\(^{22}\) Source and type: Canadian Research Chair Tier II; Canada Council Creative Development Grant, Media Arts; Ontario Arts Council, Media Arts Grant; Ontario Arts Council, Video Production Grant; Global Research Fellowship, Association of Brazilian Business Communicators; Institute for Public Relations; Graphics Animation and New Media NCE; Canadian Media Guild Research and Policy Grants; MITACS-Mathematics of Info Technology and Complex Systems; Communications and Public Relations Foundation; Taiwan National Science Council; American Musicological Society 75 PAYS Publication Subvention; Mellon Postdoctoral Fellowship (declined); Berlin Law in Context Research Network Postdoctoral Fellowship (declined); Fulbright Award; Canadian Music Centre New Music in New Places grant for Emergence; Canadian Media Research Consortium; Ontario Media Development Corporation Research Grant; Data Visualization Grant, The Centre for Innovation in Information Visualization and Data-Driven Design; Graphics Animation and New Media National Centres of Excellence (GRAND NCE) research grant.

\(^{23}\) University-allocated grants, such as SSHRC minor grants (Arts Research Board research and project seed grants), Forward with Integrity grants, McMaster Incentive Grants, Centre for Leadership in Learning Pedagogical Grants
<table>
<thead>
<tr>
<th>Year</th>
<th>Master’s (Thesis)</th>
<th>Master’s (MRP)</th>
<th>PhD</th>
<th>PDF</th>
<th>Master’s (Thesis)</th>
<th>Master’s (MRP)</th>
<th>PhD</th>
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<td>2015-16</td>
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<td>2012-13</td>
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<td>2011-12</td>
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<td>Totals</td>
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6.2.VI: Supervision

Completed and Current Numbers of Thesis Supervisions by Faculty Member*

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<th>Name</th>
<th>Completed</th>
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<td></td>
<td>Master’s (Thesis)</td>
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<td>Attewell, Nadine</td>
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<td>Baade, Christina</td>
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24 Canadian Foundation for Innovation (CFI) Infrastructure grant
25 Numbers for the 2015 academic year reflect known funding as of June 2015 and may be incomplete.
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<tr>
<td>Hamilton, Robert</td>
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\[26\] Master’s of Arts (3), Master’s of Fine Arts (6), Master’s in Design (2)
\[27\] Master’s in Design
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<td>York, Lorraine</td>
<td>27</td>
<td>6</td>
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<td>4 0 0 4 0 *Supervisory committee activity is not reflected in this table. Numbers reflect supervision as of May 2015. (W) = withdrawn from the program () = supervisions outside of home department</td>
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<td>Zuroski Jenkins, Eugenia</td>
<td>11 (W)</td>
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**Faculty Members by Field**

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<td>Attewell, Nadine</td>
<td>Associate Professor</td>
<td>ECS</td>
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<td>Twentieth-century British and settler literary and cultural production; colonial, postcolonial, and indigenous literary, cultural, and theoretical production; modernisms; anglophone Asian and Asian diasporic literary and cultural production; projects of citizenship and nation-building; memory and historiography; colonial histories of sexual, reproduction, and transracial intimacy; mixed and multiracial identities; capitalism, empire, and globalization; utopia and speculation</td>
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<td>Baade, Christina</td>
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<td>Full</td>
<td>Popular music studies; feminist theory; critical race theory; queer theory; performance studies; radio studies; sound studies</td>
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<td>Bannerman, Sara</td>
<td>Associate Professor</td>
<td>CSMM</td>
<td>Full</td>
<td>Copyright; new media; communication policy; Internet law and policy; media law and regulation; crowdfunding</td>
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<tr>
<td>Brophy, Sarah</td>
<td>Professor</td>
<td>ECS</td>
<td>Full</td>
<td>British literature and culture since 1945; life writing and theories of witnessing; visual culture studies; critical approaches to embodiment &amp; disability; postcolonialism and critical race studies; theories of gender and sexuality; cultural studies</td>
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<tr>
<td>Coleman, Daniel</td>
<td>Professor</td>
<td>ECS</td>
<td>Full</td>
<td>Canadian literature; gender studies; indigenous studies; critical race and ethnicity studies; postcolonial theory; migration/diaspora literature; reading.</td>
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<tr>
<td>Dean, Amber</td>
<td>Assistant Professor</td>
<td>ECS/GSFR</td>
<td>Full</td>
<td>Cultural studies; poststructural feminist theorizing; trauma and memory studies; visual culture studies; gender and sexuality studies; urban studies; critical race and Indigenous studies</td>
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<tr>
<td>Flynn, Terry</td>
<td>Assistant Professor</td>
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<td>Public relations; crisis management; communication studies; reputation management</td>
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<tr>
<td>Gardner, Paula</td>
<td>Associate Professor</td>
<td>CSMM</td>
<td>Full</td>
<td>Media and cultural studies; feminist theory; science and technology studies; visual culture; digital video and multimedia production.</td>
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<td>Giroux, Henry</td>
<td>Professor</td>
<td>ECS</td>
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<td>Cultural studies; youth; critical pedagogy; democratic theory; public education; communication theory; social theory; and the politics of higher education</td>
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<td>Giroux, Susan Searls</td>
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<td>Critical theory, race/ethnic studies, globalization, cultural studies, radical theories of education, and modern and postmodern American literature</td>
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<tr>
<td>Goellnicht, Donald</td>
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<td>ECS</td>
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<td>Asian American and Asian Canadian literature and culture; critical race and ethnic studies; diaspora and refugee studies; gender and queer studies</td>
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<td>Performance theory; performance and public life; dramaturgy of activist performance; cross-cultural understandings of performance practices</td>
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<tr>
<td>Hamilton, Robert</td>
<td>Professor</td>
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<td>Full</td>
<td>Digital media; Internet, design; interactivity; communication studies; photography, history of design; animation</td>
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<tr>
<td>Hirji, Faiza</td>
<td>Associate Professor</td>
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<td>Diasporic media; representations of race, religion, ethnicity and gender; youth and media; popular culture, especially television and music; Islam and media; audience studies</td>
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<tr>
<td>Hladki, Janice</td>
<td>Associate Professor</td>
<td>SOTA, ECS, GSFR</td>
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<td>Visual Culture Studies, Artistic Practice in Film and Video Art, Curation, Collaboration, Feminist Studies, Disability Studies and Theories of Embodiment, Social</td>
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<td>Mactavish, Andrew</td>
<td>Associate Professor</td>
<td>CSMM</td>
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<td>Ogborn, David</td>
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<td>Computational media; live coding, network music and art; laptop orchestras;</td>
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<td>Video; film; photography; web-based art; digital media; performance art;</td>
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<td>installation art; conceptual art; video and audio preservation; women's studies;</td>
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<td>Quail, Christine</td>
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<td>television studies, communication and culture, youth and media, and political</td>
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<td>Audiences; communication policy &amp; law; broadcasting &amp; new media; political economy of communication &amp; culture; international communication</td>
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<td>Smith, David Harris</td>
<td>Assistant Professor</td>
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<td>Theory, research and practices of digital arts; code and design; image and sound arts; DIY media; avatar virtual worlds; emerging media; digital cultures</td>
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<tr>
<td>York, Lorraine</td>
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<td>Canadian literature; literary celebrity; celebrity culture; women's collaborative writing</td>
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<td>Zuroske Jenkins, Eugenia</td>
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<td>Restoration and 18th century British literature; material culture; subjectivity; Orientalism and postcolonial studies; cosmopolitanism; gender and sexuality studies; affect studies; humour; taste and disgust; literary form and genre; fiction and the novel</td>
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QUALITY & OTHER INDICATORS

7.1: Academic Quality of the Program

Indicators that will be used to document and demonstrate the quality of the program will include:
- Scholarly, professional, and other activities among student body, including publications, exhibitions, performances, presentations, knowledge translation work, etc.
- Formative assessment and feedback from students, including: annual in-program student satisfaction surveys administered through the Graduate Student Caucus and exit surveys of graduating students
- Time to completion rates
- Awards, grants, scholarships, prizes received by students and faculty
- Grade averages
- Retention rates
- Employability and employment experiences of program alumni
- Student support: TAships, RAships, funding for conference attendance, etc.

7.2 Intellectual Quality of the Student Experience

Faculty in the program will ensure the intellectual quality of the student experience in the following ways:
- One of the two co-directors of the program will build a connection with each student through their role as facilitator of the foundation seminars.
- Foundation seminars modules will be taught by a range of faculty, ensuring their interaction with students and the transmission of a wide range of expertise.
- An on-going relationship with faculty will be supported by the annual first-year seminar in which upper year students will share their work with incoming students and faculty in the program. All core faculty will be encouraged to attend the seminar.
- A student’s supervisor will support the student’s progress through the program through regular meetings, including an annual committee meeting, meetings to discuss preparation for the comprehensive exams and regular thesis meetings.
- Faculty in the program maintain impressive publication, performance and research-creation records, ensuring not only that students are taught by experts working at the leading edges of their fields but also that the problem-based approach of the program remains focused on current and emerging issues.
- When appropriate, faculty in the program will engage students as research assistants, co-publishers, co-researchers, and collaborators on a variety of projects according to their interests and expertise. This will ensure that junior scholars are provided with support and mentorship in learning the processes involved with preparing and disseminating intellectual and artistic work.
I Proposal to Establish an Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) program
At its meeting of January 26, 2016 Undergraduate Council approved a proposal to establish an Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) program. The IBEHS+ is an innovative collaborative program proposed by the Faculties of Engineering and Health Sciences. The program will build strong foundations in both engineering and the health sciences and will expose students to the inherent interdisciplinary nature of the Biomedical Engineering field, which integrates biological and medical sciences with engineering and the physical sciences.

This direct-entry program consists of a common first year, after which students will be able to choose one of two degree pathways with a common core, leading to either a five-year Honours Bachelor of Health Sciences in Health, Engineering and Entrepreneurship (HEE specialization) or a five-year Bachelor of Engineering in Engineering and Biomedical Engineering (BME specialization). The Biomedical Engineering specialization combines the requirements of one of eight Engineering discipline streams (Chemical, Civil, Electrical, Engineering Physics, Materials, Mechanical, Mechatronics, and Software) with requirements specific to the IBEHS+ program. Each degree pathway also includes a Co-op option.

that Senate approve the establishment of an Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) program leading to one of two degree pathways, Honours Bachelor of Health Sciences in Health, Engineering and Entrepreneurship or Bachelor of Engineering and Biomedical Engineering in Engineering and Biomedical Engineering, and the corresponding Co-op programs, Engineering and Biomedical Engineering Co-op and Health, Engineering and Entrepreneurship Co-op, for inclusion in the 2017-2018 Undergraduate Calendar, as set out in the attached.

For Information:

II Curriculum Revisions for Inclusion in the 2016-2017 Undergraduate Calendar
At the same meeting, Undergraduate Council approved curriculum revisions in the Faculty of Engineering, Faculty of Health Sciences and the Faculty of Humanities, for inclusion in the 2016-2017 Undergraduate Calendar.

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: February 10, 2016
NEW PROGRAM PROPOSAL FOR:

Bachelor of Engineering (B.Eng.) in 'Engineering and Biomedical Engineering' and 'Engineering and Biomedical Engineering Co-Op'

Bachelor of Health Sciences (B.H.Sc.) in 'Health, Engineering and Entrepreneurship' and 'Health, Engineering and Entrepreneurship Co-Op'

Date: January 2016
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1. PROGRAM

1.1 PROGRAM DESCRIPTION

The Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) program will be an interdisciplinary undergraduate program that will build strong foundations in both engineering and the health sciences. An important goal of this program is to expose students to the inherent interdisciplinary nature of the Biomedical Engineering field, which integrates biological and medical sciences with engineering and the physical sciences. The plan is to begin offering this program in September 2017.

Biomedical engineering is an emerging field requiring graduates with both specialized training and an interdisciplinary breadth across many areas of study. This new innovative program aims to produce such graduates, as it will be the first of its kind in Canada to offer a 5-year ‘Biomedical Engineering + Specialization’ program that integrates Engineering with the Health Sciences. This program will replace the existing 4-year Electrical and Biomedical Engineering program, placing a greater emphasis on interdisciplinary education, translational design, and innovation and entrepreneurship. The proposed structure provides interdisciplinary education within biomedical engineering and the health sciences in addition to specialized education, either in a core engineering field or in entrepreneurial health and technology. Students enrolled in the program will have the option of pursuing either a Bachelor of Engineering (B.Eng.) degree in Engineering and Biomedical Engineering or a Bachelor of Health Sciences (B.H.Sc.) degree in Health, Engineering and Entrepreneurship. In addition, each specialization is also offered with an optional Co-op, providing students the opportunity to complete at least 12 months of industrial/practical experience prior to graduation. The program structure will ensure that students in each of these streams will achieve learning outcomes and Undergraduate Degree Level Expectations consistent with the corresponding programs currently offered at McMaster.

All students in the IBEHS+ program will be enrolled in a common first year comprising 3 courses (9 units) in Mathematics, 2 courses (6 units) in Physics, 1 course (6 units) in Biology, 1 course (3 units) in Chemistry, 1 10 unit Health Solutions Design Projects course, and a 3 unit complementary studies elective. The Health Solutions Design Projects course will cover topics in engineering ethics and professionalism, design and graphics, computation, and materials, with the key assessment being a series of biomedical-related design projects. This course is the first in a stream of integrated learning projects that flows through the program. Beginning in Level II, students will pursue either an Engineering or Health Sciences degree focus. Students in the Engineering specialization will be enrolled in one of 8 Engineering disciplines (Chemical, Civil, Electrical, Engineering Physics, Materials, Mechanical, Mechatronics, and Software). Both the Engineering and Health Sciences specialization will comprise core IBEHS+ courses, courses specific to their chosen discipline, elective courses from health sciences and elective courses from the various engineering disciplines covering several biomedical topics. The purpose of this model is to ensure students gain an interdisciplinary biomedical competency in addition to specialized competency in a parent discipline. This is expected to qualify graduates for licensure in a core Engineering discipline and Biomedical Engineering. The core IBEHS+ component includes courses in Science, Health Sciences, and Engineering. In addition, through every year, beginning with the Health Solutions Design Projects course in Level I, students will take a series of project/inquiry-based courses where they will collaborate in teams to solve problems of an interdisciplinary nature.
With the unique combination of skills and knowledge that the IBEHS+ program will provide, graduates of this program will not only be uniquely positioned for careers in the biomedical engineering, biotechnology, and health and biomedical science sectors of the economy, but they will remain well-positioned for careers that additionally fall within the spectrum of their parent discipline. Likewise, they will be well equipped to pursue further studies in graduate research or health sciences.

1.2 PROPOSAL PREPARATION AND CONSULTATION PROCESS

During the last decade the Faculties of Engineering and Health Sciences have investigated the establishment of an undergraduate biomedical engineering program that would include a very significant component of health sciences courses and concepts. The Faculty of Engineering already has established a strong 4-year Electrical and Biomedical Engineering program which included a full year of Health Sciences anatomy and physiology. Several surveys of the students enrolled in the existing 4-year Electrical and Biomedical Engineering program indicated general satisfaction with the structure and content, but found there was not enough exposure to health sciences or other engineering disciplines. Further, many found this four year program was very inflexible and compressed, and between one third and half of each class chose to extend it to five years giving them more electives and opportunities to take a minor in a life sciences discipline.

Beginning in 2005, discussions among the leadership of the Faculty of Engineering and of the Faculty of Health Sciences began on the possibilities of a new multidisciplinary program that would more heavily integrate engineering and health sciences. The first formal collaboration between the two faculties involved the design of a 5-year program leading to a general biomedical engineering CEAB accreditable Bachelor of Engineering (B.Eng.) degree and Bachelor of Health Sciences (B.H.Sc.) degree. This program was approved by the two faculties in late 2005 but further approval was not received due to budgetary constraints. Although interest remained high during the following years, there were no concerted initiatives or discussions until a preliminary proposal was presented at a Faculty of Engineering retreat in December 2014 which included Faculty of Health Sciences representation.

A second retreat and the establishment of interfaculty and interdepartmental working groups in early 2015 started a concerted effort to establish a collaborative program between the two faculties. Over this same time period, we consulted informally with students and graduates to acquire their feedback. An ad-hoc Program Development Committee was then struck and met regularly to assemble a potential framework for the new program. Once the framework was established, the committee members met with the Departments from each faculty that would be involved with the program. The Departments were extremely enthusiastic about this initiative and unanimously approved of the framework. In designing the Health Solutions Design Projects, which would be heavily integrated between biomedical engineering and health sciences, we consulted extensively with the current integrated learning program in the Faculty of Science. Health Sciences also consulted the DeGroote School of Business in designing the Health, Engineering and Entrepreneurship courses.

This program proposal was jointly prepared by the Faculty of Health Sciences and the Faculty of Engineering.
1.3 CONSISTENCY WITH MCMASTER’S MISSION AND ACADEMIC PLAN

The Faculty of Engineering is well-established and accomplished in undergraduate education, with a demonstrated track record in educational offerings that promote problem-based learning, and more recent emphasis placed on experiential learning. The Faculty offers a full range of undergraduate and graduate programs across seven departments, including several interdisciplinary programs in collaboration with other Faculties at McMaster. Our highly successful five–year Engineering and Management and Engineering and Society programs are aimed at broadening students’ knowledge in areas that complement their engineering education. The Faculty of Engineering is well known for its engagement with industry and the community, and is accredited by the Canadian Engineering Accreditation Board (CEAB).

The Faculty of Health Sciences is at the leading edge of health sciences education in Canada, covering the full spectrum of health care, including schools of medicine, nursing and rehabilitation, midwifery education, an undergraduate Bachelor of Health Sciences program and a multidisciplinary biomedical commercialization program in collaboration with the DeGroote School of Business. The Faculty utilizes a unique interdisciplinary approach to the study of health, wellness and illness. Inquiry-based learning approaches emphasize transferable skills in the biomedical sciences, including oral and written communication, problem-solving, critical thinking, and the acquisition of important and practical laboratory and research skills.

McMaster’s Strategic Mandate Agreement

The attributes and goals of the IBEHS+ program are well-aligned with McMaster’s mission and academic plan. Specifically, these attributes and goals are to:

- Address key areas of growth in Health Sciences and the broad determinants of health, and Science and Engineering through the development of an interdisciplinary engineering program in biomedicine and health (University Mandate Statement, http://www.mcmaster.ca/vpacademic/documents/SMA-McMaster-March.2014.pdf)
- Address key areas of institutional strength in Health and society, Medical Education and Research, and Engineering and sustainability (University Mandate Statement)
- Enhance the connections between McMaster and the communities we serve (University Mandate Statement)
- Impart technical and professional skills that will permit our graduates a range of career choices (McMaster University Academic Plan, http://www.mcmaster.ca/newsevents/acadplan.htm)

The McMaster University Strategic Mandate Agreement identifies two key areas of growth that will be addressed by this program; these areas of growth are in Health Sciences and the broad determinants of health, and Science and Engineering. The Strategic Mandate Agreement explicitly identifies a plan for growth within interdisciplinary engineering programs in biomedicine and healthcare, a growth that will be met through this new program. As stated in the Strategic Mandate Agreement, the Faculty of Health Sciences is also committed to growth and
differentiation in its professional programs, and this planned growth will be achieved through collaboration with the Faculty of Engineering. The new IBEHS+ program will offer an unprecedented approach to interdisciplinary education in Engineering and the Health Sciences through an innovative approach combining core biomedical engineering education with disciplinary depth in an engineering discipline, and a bachelor of Health Sciences stream with a strong technological and entrepreneurial focus. The IBEHS+ program is focused on the integration of biological and medical sciences with the engineering and physical sciences, and will deliver on McMaster’s Strategic Mandate Agreement to provide interdisciplinary perspectives on contemporary issues in engineering, health, and society. The IBEHS+ program will also serve to grow and strengthen the already successful McMaster School of Biomedical Engineering. By providing its graduate program with opportunities to collaborate with students of the IBEHS+ program, both programs stand to benefit from a sharing of knowledge and resources. Exposing students to cutting edge research at an early stage in their education will benefit the graduate program and research, which stands to benefit graduate recruitment down the road.

The key areas of institutional strength this program will address are in Health and society, Medical Education and Research, and Engineering and sustainability. These areas are already inherent strengths of the Faculty of Health Sciences and Faculty of Engineering, who will jointly administer the program. The IBEHS+ program brings these areas of institutional strength together in order to establish a strong interdisciplinary program focused on engineering innovation and medical discovery.

The Faculty of Engineering and Faculty of Health Sciences have already demonstrated a commitment to achieving international distinction for creativity, innovation and excellence through their existing programs, and this program will continue the commitment. At the core of the IBEHS+ program is a series of Health Solutions Design Projects courses that will provide students with the opportunity to foster discoveries through both self-directed learning and engagement with a multidisciplinary group of faculty and graduate students who have demonstrated academic success and hold strong roots in both industry and the community. Collaborating in multidisciplinary teams, students will serve as active members of the community to enhance the connections between McMaster and the surrounding communities, offering biomedical engineering solutions to real-world healthcare problems. Through opportunities such as these, we aspire to develop critical thinkers who have a passion for lifelong learning. Ultimately, it is our goal to prepare graduates for a successful careers.

We firmly believe that, by providing an interdisciplinary program that broadens knowledge base while still providing room for specialization in key areas of engineering and health, we are meeting a need for well-rounded leaders that can serve the social, cultural, and economic needs of our community and our society. Through its interdisciplinary educational offerings and emphasis on problem-based and inquiry-based approaches to learning, the IBEHS+ program will enable students to develop a combination of technical and professional skills that will permit a range of career choices upon graduation.

McMaster’s Current Priorities

The IBEHS+ program aligns with the four priorities outlined in President Deane’s letter to the McMaster community, Forward with Integrity: Student Experience, Community Engagement, Research, and Internationalization. The program will attract top students with an aptitude for the basic sciences and mathematics, who also have a strong interest in health and engineering. To accomplish this, our aim is to attract the brightest minds with a diversity of backgrounds from around the world. As both Engineering and Health Sciences have applications to problems across
the globe, the program will teach students the importance of community engagement, and give them the skills and knowledge to offer biomedical engineering solutions to real-world healthcare problems using a breadth and depth of knowledge that is informed by global awareness, and serves the community locally, nationally, and globally. This is in keeping with the University’s goals of Internationalization and Community Engagement. Not only will students be drawn to a program that prepares graduates for successful post-secondary careers, they will be drawn to a program that provides for an exciting and innovative Student Experience. This student experience will be driven by teaching practices that place a strong emphasis on experiential learning, self-directed learning, and interdisciplinarity. Undergraduate learning will also place a strong emphasis on problem-based learning and self-directed learning principles. These principles are strengths of both the Faculty of Health Sciences and Faculty of Engineering. Through courses that promote these principles of learning, students will work alongside both faculty and graduate students to develop biomedical engineering solutions that will foster a capacity for Research and strengthen and support the University’s overall commitment to discovery.

1.4 PROGRAM LEARNING OUTCOMES

The Integrated Biomedical Engineering and Health Sciences Plus program emphasizes interdisciplinary learning, innovation, translational design and research, and the integration of engineering and the health sciences. The central goal of the program is to produce graduates who will be equipped with a breadth of knowledge in both biomedical engineering and the health sciences, whilst also possessing either specialized disciplinary depth in a core engineering field through the Biomedical Engineering (BME) specialization, or specialized knowledge in entrepreneurial health and technology through the Health, Engineering and Entrepreneurship (HEE) specialization. To that end, the following overarching learning outcome highlights the outcome of achieving this central goal:

- Graduates of the program will be able to offer innovative biomedical solutions to real-world healthcare problems by applying translational design and research practices

To achieve the central goal of the program, a 5-year structure is proposed for both specializations. For the BME specialization, five years is necessary to ensure students receive: 1) the foundational knowledge in both the basic sciences and health sciences, 2) the interdisciplinary breadth of knowledge in biomedical engineering, and 3) the specialized disciplinary depth required for engineering licensure in biomedical engineering and a core engineering discipline. For the HEE specialization, five years provides students with: 1) the necessary knowledge in math and sciences that lays the groundwork for a biomedical engineering education, 2) a core entrepreneurial education in health and technology, and 3) the flexibility to explore educational opportunities in engineering and the health sciences. The Faculty of Engineering already has a history of offering breadth and depth in two disciplines through its highly successful Engineering and Management program.

Students in the IBEHS+ program are enrolled into a common Level I program and branch off into either the BME specialization or HEE specialization beginning in Level II, as outlined above and in Sections 2.1 and 3.2. The program has a defined set of learning outcomes that are common to all students in the program, and that emphasize the integrated nature of the program. These 12 program learning outcomes are outlined below.
Learning Outcomes Common to the IBEHS+ program

Upon completion of the undergraduate program, all graduates of the Integrated Biomedical Engineering and Health Sciences Plus program will be able to:

A1 Apply knowledge of mathematics (including differential equations and statistics), life and physical sciences, and engineering.

A2 Apply knowledge of health from biological, behavioural, and population-based perspectives.

A3 Demonstrate an understanding of the structure, function and behaviour of the human body, the environmental determinants of health and the ways that these factors interact to result in disease or illness.

A4 Exhibit a working knowledge of contemporary issues in biomedical engineering and health care.

A5 Identify, formulate, and solve problems at the interface of engineering and health sciences.

A6 Employ translational design and research practices to solve biomedical engineering problems of an interdisciplinary nature.

A7 Collaborate effectively with peers in multidisciplinary teams.

A8 Communicate in a professional manner to interdisciplinary audiences.

A9 Contribute to the assessment process through personal and peer evaluations.

A10 Demonstrate a strong sense of personal awareness.

A11 Demonstrate an understanding of societal, professional and ethical responsibility.

A12 Recognize the need for, and demonstrate an ability to engage in, life-long learning.

Those learning outcomes address the Graduate Attributes requirements for an Engineering degree (Appendix A), as outlined by the Canadian Engineering Accreditation Board (CEAB), as well as the 6P's that serves as the central goal of the current 4-year Bachelor of Health Sciences program (problem identification, problem solving, professional communication, peer collaboration, personal awareness and personal/peer evaluation).

The integration of engineering and the health sciences that is built into the above Program Learning Outcomes (PLOs) is of utmost importance. Within each faculty lies a successful culture of education and learning that is unique and appropriate for the programs offered, and the students bring with them their own unique way of thinking and seeing the world. Combining these cultures and this student cohort will offer tremendous benefits, not only to the program, but to each faculty as well and the University as a whole. The IBEHS+ program will be able to tap directly into the strengths in educational offerings and approaches to learning that make each Faculty successful. In addition, the program will bring together students from each faculty who possess different aptitudes. These students will learn to build on their strengths and work together towards developing solutions to real-world problems in healthcare, problems that are far too complex to solve without bringing together individuals from different specializations to share their knowledge and expertise.

Students entering Level II of the IBEHS+ program will have the option to enter into the BME specialization through the Faculty of Engineering or the HEE specialization through the Faculty of Health Sciences. Each specialization has its own set of learning outcomes that are consistent with the respective faculty, in addition to common learning outcomes that emphasize the integrated nature of the program.
Learning Outcomes for the Biomedical Engineering specialization

Graduates in the Biomedical Engineering specialization will meet additional Learning Outcomes in order to give them depth in an engineering discipline. In keeping up with Biomedical Engineering as an emerging discipline, it is important that BME graduates, in addition to meeting the overarching Learning Outcome described above, possess the technical skills and disciplinary depth to provide engineering solutions to healthcare problems. These engineering-focused Learning Outcomes, which are unique to each parent discipline, have been previously mapped to CEAB Graduate Attributes and their associated Indicators (Appendix B), and are accordingly an accreditation requirement for engineering licensure. Both the Learning Outcomes and curriculum content for each parent discipline have prior approval. Therefore, these individual Program Learning Outcomes have been left out for the sake of brevity.

Learning Outcomes for the Health, Engineering and Entrepreneurship specialization

In addition to the learning outcomes common to all graduates in the IBEHS+ program, graduates in Health, Engineering and Entrepreneurship specialization will be able to:

H1 Identify and evaluate opportunities, needs and trends in the health and biomedical engineering sectors of the economy.

H2 Apply design thinking to health and biomedical problems.

H3 Understand markets, customer service and relationships and sales and marketing strategies.

H4 Understand finance and fundraising from discovery through product and service development.

1.5 CONSISTENCY WITH DEGREE LEVEL EXPECTATIONS

The learning outcomes for this program were specifically developed to align with the Graduate Attributes and Indicators used by the Canadian Engineering Accreditation Board (CEAB) in assessing Engineering education. All existing engineering programs have well-established learning outcomes that are mapped to these Indicators, and have been rigorously assessed for the past several years in preparation for the Faculty’s recent 2015 accreditation visit and upcoming IQAP review. To meet the undergraduate requirements of McMaster University, all CEAB Indicators have been mapped to each of the undergraduate Degree Level Expectations (UDLEs). Therefore, in mapping each of the program learning outcomes to all the CEAB Indicators, the program learning outcomes are also mapped to the UDLEs. For both the Engineering specialization and the Health Sciences specialization, which share a common set of program learning outcomes (see Section 1.4 above), the mapping of learning outcomes to UDLEs is given in Table 1 and 2, respectively. The CEAB Graduate Attributes, and Associated CEAB Indicators as well as the complete list of UDLEs can be found in Appendix A, Appendix B and Appendix C. The mapping of the CEAB Indicators to the UDLEs can be found in Appendix D, and the mapping of the program learning outcomes to the CEAB Indicators can be found in Appendix E.
Table 1. Summary of the association of program learning outcomes with CEAB indicators and UDLEs

<table>
<thead>
<tr>
<th>Program Learning Outcomes</th>
<th>CEAB Indicators</th>
<th>Associated UDLE</th>
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<tbody>
<tr>
<td>A1</td>
<td>1.1-1.4</td>
<td>1a, 1b</td>
</tr>
<tr>
<td>A2</td>
<td>1.2</td>
<td>1a, 1b</td>
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<tr>
<td>A3</td>
<td>1.2</td>
<td>1a, 1b</td>
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<tr>
<td>A4</td>
<td>1.4</td>
<td>1a, 1b</td>
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<tr>
<td></td>
<td>2.1-2.2</td>
<td>1e, 2a, 3g</td>
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<tr>
<td></td>
<td>3.1</td>
<td>1c, 1d, 3b, 3c, 3e</td>
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<tr>
<td></td>
<td>9.1</td>
<td>1f</td>
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<tr>
<td></td>
<td>10.3</td>
<td>6e</td>
</tr>
<tr>
<td>A5</td>
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</tr>
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<td></td>
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<td>6.1-6.3</td>
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</tr>
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<td>7.1-7.3</td>
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<td>A9</td>
<td>7.2, 7.3</td>
<td>2c, 3a, 4</td>
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<tr>
<td>A10</td>
<td>6.1-6.3</td>
<td>6a, 6b, 6c</td>
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<tr>
<td></td>
<td>9.2</td>
<td>5</td>
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<tr>
<td>A11</td>
<td>8.1-8.3</td>
<td>6a, 6e</td>
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<td></td>
<td>13.1, 13.3-13.5</td>
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<td>A12</td>
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<td>1b, 1c, 1f, 3i, 6d</td>
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</table>

Table 2. Summary of the association of program learning outcomes with UDLEs unique to the Health, Engineering and Entrepreneurship specialization

<table>
<thead>
<tr>
<th>Program Learning Outcomes</th>
<th>Associated UDLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>1a, 1b, 1ci, 1cii, 3b, 3ci, 3c, 3d, 3e, 4, 6</td>
</tr>
<tr>
<td>H2</td>
<td>1ci, 1cii, 2a, 2b, 2c, 3b, 3ci, 3d, 4, 5, 6</td>
</tr>
<tr>
<td>H3</td>
<td>3a, 3b, 6</td>
</tr>
<tr>
<td>H4</td>
<td>1a, 1b, 2a, 3b, 3c, 6</td>
</tr>
</tbody>
</table>

While each specialization has its own Program Learning Outcomes that fall in line with the learning outcomes of the respective faculty, the core Program Learning Outcomes common to the IBEHS+ program were specifically designed to meet each of the UDLEs.

Depth and Breadth of Knowledge: Students will develop an understanding of the basic sciences and engineering beginning in Level I of the program (PLO A1). Beginning in Level II, students will take a series of core courses focused on developing a breadth of knowledge in the biomedical sciences and in health (PLO A2, PLO A3). Students will also take several biomedical engineering
courses intended to develop critical thinking and analytical skills in order to identify, formulate and solve problems of a biomedical nature (PLO A5). In line with the interdisciplinary nature of the IBEHS+ program, students will take a series of project-based design courses intended to develop a working knowledge of contemporary issues related to these fields, including those related to society, ethics, and professionalism (PLO A4 and PLO A11). These design courses will teach students to gather, review, evaluate and interpret information in the context of real-world biomedical problems (PLO A6). Through a developed understanding of how the biomedical engineering and health sciences fields intersect, students will recognize the need for engaging in life-long learning in order to be able to continue developing biomedical engineering solutions to real-world health care problems (PLO A12). Students in the Health, Engineering and Entrepreneurship specialization will develop knowledge in these three key areas. Needs and trends in health and engineering will be identified and, through an understanding of financing and fundraising, and by applying design thinking practices, students will develop solutions for health and biomedical problems (PLO H1, PLO H2 and PLO H4).

Knowledge of Methodologies: Within the core IBEHS+ curriculum, students will develop an understanding of both methods of enquiry and creative activity. The project-based design course will provide students with a working knowledge of contemporary issues in biomedical engineering and health care (PLO A4). Students will be exposed to different methodologies in both design and research, and will be able to evaluate the appropriateness of these methodologies for solving a particular problem. For Health, Engineering and Entrepreneurship students, this includes evaluating methods in finance and fundraising towards product and service development (PLO H4). Students will also be able to use these methodologies to solve real-world health and biomedical problems (PLO A6 and PLO H2), communicate their findings to others (PLO A8) and contribute to the assessment process through personal and peer evaluation (PLO A9). In addition to these outlined courses, students will also take several technical courses that identify and formulate approaches to solving biomedical problems (PLO A5).

Application of Knowledge: Through the core of the IBEHS+ curriculum as well as for the Health, Engineering and Entrepreneurship specialization, students will identify, formulate, and solve problems at the interface of engineering and health (PLO A5, PLO H1 and PLO H2), and be able to effectively develop and communicate lines of argument (PLO A8). This will enable them to apply concepts and techniques of analysis to biomedical problems, and make sound judgments in dealing with topics related to this field of study. Through a working knowledge of contemporary issues in biomedical engineering and health care (PLO A4), students will gain the necessary skills to critically evaluate arguments, assumptions, and information, propose solutions to biomedical problems, and work towards those solutions where appropriate. These skills will further be applied towards evaluating one’s own work and the work of others (PLO A9). The project-based design courses in particular are focused on enabling students to apply their gained knowledge to solving real-world problems in health care (PLO A6). Creativity in the application of knowledge will be emphasized. Students will learn to seek out scholarly reviews and other sources of information in order to solve real-world problems, contributing to their understanding of the importance of life-long learning (PLO A12). Students in the Health, Engineering and Entrepreneurship specialization will additionally apply knowledge in sales, marketing, finance and fundraising as they pertain to health and biomedical problems (PLO H3 and PLO H4).

Communication Skills: A key component of the project-based design courses in the IBEHS+ program relates to developing communication skills. Upon graduation, students will be able to communicate effectively to interdisciplinary audiences, which includes groups with technical and non-technical backgrounds (PLO A8). This ability to communicate includes being able to
formulate logical and succinct arguments both in writing and orally, answer questions of a technical and non-technical nature, and contribute to the evaluation process by providing both qualitative and quantitative feedback to their peers (PLO A9). Communication skills will be similarly emphasized for Health, Engineering and Entrepreneurship students, as students will need to communicate ideas to diverse sectors of the economy as they apply to solving health and biomedical problems (PLO H1 and PLO H2).

**Awareness of Limits of Knowledge:** While the project-based design courses in the IBEHS+ and HEE curricula are aimed at developing a breadth and depth of knowledge, and learning to apply that knowledge, there will be a particular emphasis placed on developing and demonstrating a strong sense of personal awareness (PLO A10) and understanding the limits one’s own knowledge and ability. This is critical to learning to identify and formulate solutions to biomedical problems, and being able to apply translational design and research practices to solving such problems (PLO A5, PLO A6 and PLO H2). Identifying a correct solution to a problem first requires identifying one’s own limitations, especially in regards to open-ended problems without a known solution.

**Autonomy and Professional Capacity:** The IBEHS+ program will aim to prepare graduates for successful careers in the biomedical fields. To that end, students will demonstrate an understanding of societal, professional and ethical responsibility in relation to contemporary issues in biomedical engineering and health care, and will learn the importance of acting with integrity and maintaining accountability (PLO A4, PLO A11). In the project-based design courses, students will work in multidisciplinary teams, employing decision-making practices to solve complex problems of an interdisciplinary nature (PLO A6, PLO A7). These courses will give students the ability to manage their own learning by placing them in situations that require the independent identification of sources, including those outside the nominal course curriculum (PLO A12). Students in the HEE specialization be able to identify and evaluate opportunities and trends in health and biomedical engineering (PLO H1), and will develop qualities and transferable skills in design thinking, sales and marketing, and finance and fundraising (PLO H2, PLO H3 and PLO H4). Finally, students will develop and demonstrate a strong sense of personal awareness by learning to become more comfortable with uncertain situations and more self-directed in their own learning (PLO A10).

### 1.6 DEMAND FOR PROGRAM

#### i. Evidence of Societal/Labour Market Need

Biomedical engineering is a sub-field of engineering that is emerging as a key area for growth ([http://www.engineerscanada.ca/sites/default/files/w_Engineering_Labour_Market_in_Canada_Oct_2012.pdf](http://www.engineerscanada.ca/sites/default/files/w_Engineering_Labour_Market_in_Canada_Oct_2012.pdf)). Biomedical engineers research, design, and develop systems necessary for the medical field. Examples include include artificial organs and joints, prostheses, magnetic resonance imaging scanners, and other medical devices. Demand for advances in these products further drives demand for biomedical engineers ([http://www.bls.gov/ooh/architecture-and-engineering/biomedical-engineers.htm](http://www.bls.gov/ooh/architecture-and-engineering/biomedical-engineers.htm)). The key role of a biomedical engineer is to “bridge the gap” between the life sciences, medical and engineering disciplines ([http://bmes.org/content.asp?contentid=40](http://bmes.org/content.asp?contentid=40)).

**Biomedical Engineering in Canada**

Within Canada, biomedical engineering remains a relatively small branch of engineering. Currently there is no occupational group in the National Occupational Classification (NOC)
System specifically called “biomedical engineer”. Rather, biomedical engineers are classified as “other professional engineers, n.e.c. (2148)” and are grouped alongside “agricultural and bioresource engineers”, “engineering physicists and engineering scientists”, “marine and naval engineers”, “textile engineers”, and other specialized engineering occupations which are not classified elsewhere. The Ministry of Training, Colleges and Universities (MTCU) classifies employment prospects for this group of engineers between 2013 and 2017 as “average” (https://www.app.tcu.gov.on.ca/eng/labourmarket/ojf/profile.asp?NOC_CD=2148), indicating that jobs are expected to be more difficult to find than those occupations rated as “above average” but easier to find than those occupations rated as “below average”. This is consistent with employment prospects for most engineering fields. Biomedical engineering is relatively new to the Canadian market whereas, in the United States, it is a more established field and has a larger output of biomedical technologies. In 2013, biomedical engineering was second on the US Bureau of Labor Statistics’ list of the fastest growing occupations, with employment projected to grow 62% by 2018 (http://www.careercast.com/slide/best-jobs-2013-2-biomedical-engineer). The occupation also ranked one on Forbes’ 2014 list of the best jobs in healthcare (http://www.forbes.com/pictures/fefi451kef/1-biomedical-engineer/).

Growth of the Biomedical Industry

Although the biomedical industry is more advanced outside of Canada, there exist several initiatives and trends that could increase Canada’s biomedical research and development and product output, and strengthen its impact on the growing global biomedical industry (http://www.kellogg.northwestern.edu/biotech/faculty/articles/future_biological_industry.pdf). These include increased investment into the biomedical sector by all levels of government, implications of the ageing demographic on the demand for biomedical technologies, and the rise of disease worldwide increasing demand for biomedical advancements.

Investments, grants, and incentive programs have recently been introduced by the government to encourage R&D projects in pharmaceuticals, medical devices, and cancer research, indicating a strong focus on progress in these areas (http://www.investtoronto.ca/Business-Toronto/Key-Business-Sectors/Life-Sciences.aspx). The city of Toronto, for example, promotes itself as North America’s largest life sciences sector and one of the highest rated biomedical sectors in the world, with 16 out of the top 25 global medical device companies’ headquarters located in the city. Toronto has recently made a number of investments into infrastructure that will provide space to conduct research and development in the biomedical field (http://www.investtoronto.ca/Business-Toronto/Key-Business-Sectors/Life-Sciences.aspx).

The ageing population will be a key source of demand for biomedical engineers’ worldwide (http://www.cae-acg.ca/wp-content/uploads/2014/05/Engineering-in-Canada-May-23,14-2.pdf). Biomedical advances will be useful in prolonging life and treating various physical and physiological ailments, and will consequently increase the need for more complex end-of-life care (http://dc.mit.edu/sites/dc.mit.edu/files/MIT%20White%20Paper%20on%20Convergence.pdf). Developments in the pharmaceutical industry, regenerative medicine, medical devices, and diagnostics will be particularly important in moving forward to support this population. Recent rises in disease worldwide and outbreaks of illnesses are also cause for concern when it comes to managing global health (https://news.brown.edu/articles/2014/10/diseases). Biomedical advances in pharmaceutical sector will be needed in order to keep up with these new risks.
Overall Outlook

Biomedical engineering is an emerging field requiring graduates with both specialized training and an interdisciplinary breadth across many areas of study. Given the initiatives and trends outlined above, there remains a need for biomedical engineers to drive the development of better and cheaper health care technologies. In relation to the increased demands of an ageing population, there is also increasing need for development of independent living and home care solutions that take the elderly and infirm out of institutions and into their homes.

To position the graduates for these challenges, the IBEHS+ program will be the first of its kind in Canada to offer a 5-year ‘Biomedical + Engineering Specialization’ program that integrates Engineering with the Health Sciences, placing a strong emphasis on interdisciplinary education, translational design, and innovation and entrepreneurship. The proposed structure provides interdisciplinary education within biomedical engineering and the health sciences in addition to specialized education, either in a core engineering field or in entrepreneurial health and technology. With the unique combination of skills and knowledge that the IBEHS+ program will provide, graduates of this program will not only be uniquely positioned for careers in the biomedical engineering, biotechnology, and health and biomedical science sectors of the economy, but they will remain well-positioned for careers that additionally fall within the spectrum of their parent discipline. Likewise, they will be well equipped to pursue further studies in graduate research or health sciences.

ii. Evidence of Student Demand

Biomedical Engineering

Student Demand for Biomedical Engineering across Ontario

Biomedical Engineering education, in general, is in extremely high demand in Ontario. This is evidenced by the new biomedical engineering programs that have launched in recent years at Ryerson University, University of Guelph and University of Waterloo. The student demand for these programs is high, with significantly more applications for enrolment than there are available spaces. A survey commissioned by McMaster and conducted by Academica Group analyzed application and registration data for three programs (Guelph, Ryerson, and University of Waterloo) of varying size is presented in Table 3. Since 2010, there has been an upward trend in the number of applications (272 total in 2010, increasing to 393 in 2013), while the percentage of applicants who registered in the program has remained relatively consistent at between 10-14%. Overall, the demand for these programs is high, with more than 8 times as many applicants than those that were accepted and registered in the program.

Table 3. Applications and Registrations in other Ontario Biomedical Engineering Programs

<table>
<thead>
<tr>
<th></th>
<th>Total Applications</th>
<th>Total Registrations</th>
<th>Percent Registrations</th>
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</tr>
<tr>
<td>Ryerson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>162</td>
<td>192</td>
<td>191</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>272</td>
<td>334</td>
<td>313</td>
</tr>
</tbody>
</table>
Table 4 below shows applications and enrolments to the three provincial programs based on whether applicants were from within or outside of McMaster’s catchment area. A significant number of students from McMaster’s catchment area have applied to Ryerson’s Biomedical Engineering program each year, ranging from 50 to 65.

Table 4. Applications and Registrants by Catchment Area

<table>
<thead>
<tr>
<th></th>
<th>Applicants</th>
<th>Enrolments</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Guelph</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within McMaster Catchment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Outside McMaster Catchment</td>
<td>34</td>
<td>43</td>
</tr>
<tr>
<td>University of Ottawa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within McMaster Catchment</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Outside McMaster Catchment</td>
<td>63</td>
<td>91</td>
</tr>
<tr>
<td>Ryerson University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within McMaster Catchment</td>
<td>63</td>
<td>65</td>
</tr>
<tr>
<td>Outside McMaster Catchment</td>
<td>99</td>
<td>127</td>
</tr>
</tbody>
</table>

Student Demand for BME at McMaster University

The existing 4-year Electrical and Biomedical Engineering program offered by the McMaster Faculty of Engineering, is a highly competitive program that attracts exceptionally qualified students for only 40 available spaces. As the current program is set up, students enter the general Engineering I program in their first year, and apply for Level II entry to one of the many engineering programs offered by the faculty. Acceptance to these programs is competitive and based on the number of applicants in each year, and the number of available spaces (40 for the Electrical and Biomedical Engineering program). Therefore, the entrance average for each program tends to vary year-to-year. Since the 2011-12 academic year, the Electrical and Biomedical Engineering program has been in significant demand and extremely competitive, with nearly twice as many “1st choice” applicants as there are available spaces (40). These data are provided in Table 5, and include the number of students who selected the program as their 1st, 2nd, 3rd, or 4th choice. The average cumulative GPA of students in the Electrical and Biomedical Engineering program has also been considerably higher (by approximately 2 points on the McMaster 12 point scale) than the average cumulative GPA of engineering students across all programs (Table 6).
Table 5. Number of Applications for the Electrical and Biomedical Engineering (ECE&BME) Program, and the subsequent rank

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Total Eng. 1 Enrolment</th>
<th>Number of Students Applied to ECE&amp;BME Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>1st Choice</td>
</tr>
<tr>
<td>2014-15</td>
<td>974</td>
<td>182</td>
</tr>
<tr>
<td>2013-14</td>
<td>880</td>
<td>154</td>
</tr>
<tr>
<td>2012-13</td>
<td>761</td>
<td>153</td>
</tr>
<tr>
<td>2011-12</td>
<td>805</td>
<td>171</td>
</tr>
<tr>
<td>Averages</td>
<td>847</td>
<td>169</td>
</tr>
</tbody>
</table>

Table 6. Comparison of entrance averages of students in the existing 4-year Electrical and Biomedical Engineering (ECE&BME) program to entrance averages across all engineering programs

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>ECE &amp; BME Program</th>
<th>All Engineering Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enrolment</td>
<td>Cumulative GPA</td>
</tr>
<tr>
<td>2014-15</td>
<td>40</td>
<td>10.0</td>
</tr>
<tr>
<td>2013-14</td>
<td>40</td>
<td>9.2</td>
</tr>
<tr>
<td>2012-13</td>
<td>40</td>
<td>9.2</td>
</tr>
<tr>
<td>2011-12</td>
<td>40</td>
<td>9.2</td>
</tr>
<tr>
<td>Averages</td>
<td>40</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Although the data provided in Table 5 is indicative of a high student demand for Biomedical Engineering at McMaster, we expect an even higher demand for the incoming IBHS+ program. This is because the existing Electrical and Biomedical Engineering (ECE&BME) program is limited to a specialization in only electrical engineering. Students without a strong interest in electrical engineering are likely to be dissuaded from applying for the existing biomedical program. As an example, in the 2014-15 academic year, 37 students selected the ECE&BME program as their second choice (Table 5). Of those 37 students, only 9 selected another electrical program as their first choice. Of the students who did not select another electrical program as their first choice, 10 selected the Chemical Engineering and Bioengineering program, 6 selected Mechanical Engineering, 4 selected Mechatronics Engineering, and the remaining 8 selected either Chemical, Civil, Computer, Engineering Physics, or Software (data for the previous four academic years is provided in Appendix F). Based on these data, it is reasonable to suggest that some of these students would select a biomedical engineering program as their first choice if such an option allowed for specialization in their preferred discipline.

There clearly exists a strong demand within the student body for a biomedical engineering program that integrates biomedical engineering knowledge with a specialization in more than just one engineering discipline. For the 2014-15 academic year, 74 students selected the ECE&BME program with their first choice (Table 5). Of these students, less than half (31) selected another Electrical Engineering program as their second choice. The remaining students selected, as their second choice, either Chemical Engineering and Bioengineering or another Chemical program.
(16), a Mechanical Engineering program (9), a Mechatronics Engineering program (9), a Software Engineering program (6), a Computer Engineering program (2), or a Materials Engineering program (1) (data for the previous four academic years is provided in Appendix F). These data suggest that a biomedical program that is grounded in a wider selection of engineering disciplines would be in high demand and would attract exceptional students that have interests across all areas of engineering.

Health, Engineering and Entrepreneurship

The Bachelor of Health Science (Honours) program at McMaster is one of the most sought after programs in North America. Applications for the past 10 years are consistently in the range of 3,500 and fifteen percent of these represent out-of-province students. The program consistently provides 230-250 offers of admission and 190-200 students accept the offer. More than 3,200 students are rejected. Fourteen hundred students present with high school averages over 93 percent and more than 900 are over 95 percent on a consistent basis. Approximately 70 percent attend medical schools after graduation and the remaining 30 percent engage in a wide variety of opportunities including engineering and business. Informal surveys with applicants and in-course students support an interest in combined health, business and science-engineering programming.

iii. Justifiable Duplication

The traditional approach to biomedical engineering has been to offer it as an option or specialization within a bachelor’s degree in electrical, electronics, or mechanical engineering, or as a graduate degree designed to allow further specialization in the field. However, postsecondary institutions have, in recent years, reacted to the industry’s need for highly specialized engineers and begun offering biomedical as standalone programs (http://www.engineerscanada.ca/sites/default/files/w_Engineering_Labour_Market_in_Canada_Oct_2012.pdf).

At present, there are four universities in Ontario that offer standalone biomedical engineering degrees: University of Guelph; University of Ottawa; Ryerson University; and University of Waterloo. The standard length of the academic content (excluding co-op and internships) is four years. The existing McMaster Electrical and Biomedical Engineering program is the only program in Canada which is fully accredited in both Biomedical Engineering and Electrical Engineering. The delivery model for programs at Guelph, Ottawa and Ryerson is typically that students will spend their first year learning fundamentals of basic science and mathematics (biology, chemistry, and physics). Students then begin selecting biomedical courses in their second year, balancing their remaining years with biomedical core courses and technical electives. Students at Waterloo, however, begin with biomedical engineering courses in their first term of study. Guelph, Ottawa, and Waterloo offer specializations within their biomedical engineering programs that students can choose by way of elective selection (e.g., biomechanics, bio-signal processing and instrumentation, fluid mechanics, neuroscience, etc.). Outside Ontario, the only other strictly biomedical engineering degree is offered at University of Victoria. This is also a four-year program (with co-op available) offering specializations in Electrical and Biomedical, or Mechanical and Biomedical Engineering (See Appendix G for a list of existing related programs). In all of these cases core engineering knowledge is sacrificed to accommodate the biomedical content, creating generalists who are not sufficiently well grounded in core knowledge of an engineering discipline. Many other engineering programs across Canada offer biomedical engineering specializations as opposed to a stand-alone biomedical engineering degree. While students in these programs acquire the necessary disciplinary depth in a core engineering discipline, the program length is again only
four years, and exposure to biomedical engineering is achieved only through a limited number of courses typically offered beginning either in Year 3 or 4.

The proposed IBEHS+ program differs from the above standalone BME programs in two key areas: it offers a 5-year Biomedical Engineering + Specialization structure and integrates biomedical engineering and the health sciences through a collaboration between the Faculty of Engineering and the Faculty of Health Sciences. The former creates graduates who have the biomedical knowledge to tackle health related problems whilst possessing the core knowledge in an engineering discipline to contribute to effective solutions. The latter creates biomedical engineering generalists who have a much deeper grounding in health care to identify critical problems.

The existing McMaster 4-year Electrical and Biomedical Engineering (ECE&BME) program attempts to solve the dilemma of disciplinary depth and biomedical breadth by creating a packed curriculum. Experience with this program has taught us that a 5-year program is necessary to ensure students receive: 1) the foundational knowledge in both the basic sciences and health sciences, 2) the interdisciplinary breadth of knowledge in biomedical engineering, and 3) the specialized disciplinary depth in a core engineering field. As a point of comparison, of the 40 students enrolled in the existing ECE&BME program each year, nearly half of them decide to take an additional year of study to maintain a high level of academic performance whilst meeting the demands of the curriculum. Compared to other engineering programs in core areas (e.g., chemical, electrical, mechanical, etc.), where the education is heavily specialized, the field of Biomedical Engineering is necessarily broad, covering a wide spectrum of topics that are each grounded in these core engineering specializations. Consequently, success in this field requires collaborations between individuals who each possess disciplinary depth in a core engineering field alongside a breadth of biomedical engineering knowledge in order to apply their expertise to solving biomedical problems in healthcare. The IBEHS+ program specifically meets this requirement, and as such, is unique in Canada.

Compared to other Biomedical Engineering programs whose curricula are entrenched in engineering, and primarily technical in nature (outside of the fundamentals in basic science and mathematics), the IBEHS+ program will place much more emphasis on health through an interdisciplinary approach to education. The integration of engineering and health is of utmost importance to the success of the program and the success of its graduates. Within each of the participating faculties lies a successful culture of education and learning that is unique and appropriate for the programs offered, and the students bring with them their own unique way of thinking and seeing the world. These students will learn to build on their strengths and have the opportunity to collaborate towards developing solutions to real-world problems in healthcare, problems that are far too complex to solve without bringing together individuals from different specializations to share their knowledge and expertise. Students in the proposed program will have the opportunity (through Health Solutions Design Projects in each year of the program) to work in diverse teams with different core engineering knowledge and health care perspective to solve real world problems. This high level of integration in these respective fields doesn’t currently exist elsewhere in Canada, making the IBEHS+ program truly unique.
1.7 DEGREE NOMENCLATURE

The degree nomenclature is commensurate with the primary focus and content of each degree.

Biomedical Engineering (BME) specialization

The B.Eng. degree in the BME specialization is a five-year Honours degree offered through the Faculty of Engineering that is grounded in Program Learning Outcomes designed to meet both the Undergraduate Degree Level Expectations (UDLEs) and the Canadian Engineering Accreditation Board (CEAB) Graduate Attributes. This specialization combines the requirements of one of 8 Engineering streams (Chemical, Civil, Electrical, Engineering Physics, Materials, Mechanical, Mechatronics, and Software) with requirements specific to the IBEHS+ Program. The primary interactions of students will take place with faculty members within the IBEHS+ program and faculty members within their chosen discipline. Graduating students will receive a Bachelor of Engineering (B.Eng.) degree in their chosen discipline as well as in Biomedical Engineering. For example, students in the BME specialization who are enrolled in the Chemical Engineering discipline will, upon graduation, receive a Bachelor of Engineering (B.Eng.) in Chemical Engineering and Biomedical Engineering.

Health, Engineering and Entrepreneurship (HEE) specialization

The Bachelor of Health Sciences (Health, Engineering and Entrepreneurship) degree in the HEE specialization is a five-year Honours degree grounded in Program Learning Outcomes designed to meet the UDLEs. The primary interactions of students will take place with faculty members within the IBEHS+ program in addition to faculty members within the Faculty of Health Sciences and the Faculty of Business. Graduating students will receive an Honours Bachelor of Health Sciences (B.H.Sc.) degree in Health, Engineering and Entrepreneurship.

Rationale for Proposed Program Name

The program name Integrated Biomedical Engineering and Health Sciences Plus encompasses the central goal of the program, which is to produce graduates with: 1) a breadth of knowledge in both biomedical engineering and the health sciences, ‘Plus’ 2) either specialized disciplinary depth in a core engineering field or specialized knowledge in entrepreneurial health and technology. Additionally, the program name emphasizes that the program is a true integration of engineering and health as it relates to the biomedical field. Not only is the program an integration of courses in engineering and health sciences, but more importantly, it offers a shared student experience, bringing students from different specializations together to share knowledge and offer biomedical engineering solutions to real-world healthcare problems.

2. ADMISSION & ENROLMENT

2.1 ADMISSION REQUIREMENTS

Level I Program

To be considered for admission to Level I of the IBEHS+ program, each applicant must satisfy the existing general requirements of the university, which can be found in the latest version of the McMaster University Undergraduate Calendar. For applicants from an Ontario secondary school, the following Grade 12 U courses are required:

Page 20
1. English U  
2. Calculus and Vectors U  
3. Biology U  
4. Chemistry U  
5. Physics U  
6. Completion of one additional U or M course to total six courses

To ensure students are able to meet the Program Learning Outcomes upon graduation, applicants will be required to hold a **minimum overall average of 90% in these 6 Grade 12 U courses** to be considered for admittance to Level I of the IBEHS+ Program. This requirement is commensurate with that of the Honours Health Sciences I Program, which also requires a minimum overall average range of 90% or higher. Applicants will also be required to submit a supplemental application. These applications will be evaluated based on each applicants’ current interests in the fields of health and engineering.

**Level II Specialization**

Admission to either the Health, Engineering and Entrepreneurship (HEE) specialization or the Biomedical Engineering (BME) specialization requires successful completion of all non-elective Level I IBEHS+ courses with a minimum Cumulative Average (CA) of 4.0 (on the McMaster 12 point scale), which is in keeping with current practices in the Faculty of Engineering. This includes completion of the Level I Health Solutions Design Projects course, where students will be required to demonstrate an ability to work collaboratively in groups, and with individuals from diverse backgrounds. This is critical to ensure students will be able to meet the Program Learning Outcomes upon program completion. Students seeking admission to the BME specialization will be admitted to one of eight Level II Engineering programs (Chemical, Civil, Electrical, Engineering Physics, Materials, Mechanical, Mechatronics, or Software). Admission to a Level II Engineering program is guaranteed for all students who meet the general progress requirements. However, as each engineering program has an upper limit on enrolment, admission to a specific engineering program will be competitive based on performance.

Students in the IBEHS+ Level I Program who choose not to continue with the IBEHS+ program beyond Level I, may still pursue either a Bachelor of Health Sciences (B.H.Sc.) degree or a Bachelor of Engineering (B.Eng.) degree, provided they complete all non-elective Level I courses and meet the admission requirements specific to their desired program. Admission requirements for each program can be found in the latest version of the McMaster University Undergraduate Calendar (http://academiccalendars.rmc.mcmaster.ca/index.php?catoid=13).

**Co-Op Program**

Undergraduate students in either specialization can enroll in a Co-op or in a non-Co-op version of each specialization. Students enrolled in the former will be required to complete 12 months of industrial/practical experience prior to graduation. The 12 months experience may be acquired through a combination of three four-month experience terms, or a combination of a four month and eight month experience terms, or an experience term of 12 or 16 months duration. Students may enter the Co-op version of their program at any time up to the beginning of Term 2 of their next-to-last level of undergraduate studies. In addition to completing all of the academic requirements as specified in the McMaster University Undergraduate Calendar (http://academiccalendars.rmc.mcmaster.ca/index.php?catoid=13), students in a Co-op program must complete an introductory Co-op program course.
The Co-op program is optional, and students who for whatever reason cannot complete their co-op requirements may still graduate but without the Co-op designation on their transcripts. Students who have partially completed the Co-op requirements will not receive a Co-op designation but will have the experience acknowledged on their transcript.

In accordance with all Engineering Co-op programs, a fee will be charged for students registered in the Co-op program.

### 2.2 ENROLMENT PLANNING AND ALLOCATIONS

We plan to admit 140 students to Level I of the IBEHS+ program each year. Allowing for some attrition (7%), we expect 130 of the 140 students to progress to Level II. This rate of attrition is comparable to the Engineering 1 program. This will open up 10 spaces for students who have successfully completed the common Engineering I program to transfer into the IBEHS+ program at Level II, provided they meet the Admission Requirements outlined in Section 2.1 (these numbers are expect to vary from year-to-year). Given this alternative entry into the program (Section 2.3), we expect the same enrolment (140 students) for Level II. Allowing for additional attrition (7%) between Level II and Level V, we expect 130 students to graduate. The ideal steady-state enrolment for the entire IBEHS+ program is 700 students (140 students/year * 5 years = 700 students). Accounting for this aforementioned attrition, we expect a steady-state enrolment of 670 students (Table 7).

Table 7. Planned TOTAL enrolment for the IBEHS+ Program

<table>
<thead>
<tr>
<th>Program Year</th>
<th>2017-18</th>
<th>2018-19</th>
<th>2019-20</th>
<th>2020-21</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Level II</td>
<td>0</td>
<td>140</td>
<td>140</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Level III</td>
<td>0</td>
<td>0</td>
<td>133</td>
<td>133</td>
<td>133</td>
</tr>
<tr>
<td>Level IV</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>129</td>
<td>129</td>
</tr>
<tr>
<td>Level V</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>128</td>
</tr>
<tr>
<td>Total Enrolment</td>
<td>140</td>
<td>280</td>
<td>413</td>
<td>542</td>
<td>670</td>
</tr>
</tbody>
</table>

Caps for entry to either the Health, Engineering and Entrepreneurship specialization or the Biomedical Engineering (BME) specialization will be set at 60 and 100 students, respectively. Similarly, caps for each of the 8 Engineering programs will be set by the respective department, in agreement with the Faculty of Engineering, and are expected to vary year-to-year.

There are currently 40 spaces available in the existing 4-year Electrical and Biomedical Engineering program, all of which will be absorbed by the new IBEHS+ Program. Therefore, of the 140 students admitted to the Program each year, we expect 100 of these to be net new students, resulting in 478 net new students across the entire program by its maturity, allowing for the rate of attrition outlined above (Table 8). The projected increase in enrolment (100 net new students per year) that will result from the IBEHS+ program fits within McMaster’s total enrolment forecasts, as outlined in the university’s Strategic Mandate Agreement: http://www.mcmaster.ca/vpacademic/documents/SMA-McMaster-March,2014.pdf
Table 8. Planned **NET NEW enrolment for the IBEHS+ Program**

<table>
<thead>
<tr>
<th>Program Year</th>
<th>2017-18</th>
<th>2018-19</th>
<th>2019-20</th>
<th>2020-21</th>
<th>2021-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Level II</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Level III</td>
<td>0</td>
<td>0</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Level IV</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Level V</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td><strong>Total Enrolment</strong></td>
<td><strong>100</strong></td>
<td><strong>200</strong></td>
<td><strong>295</strong></td>
<td><strong>387</strong></td>
<td><strong>478</strong></td>
</tr>
</tbody>
</table>

2.3 ALTERNATIVE REQUIREMENTS

Level I Program

There may be outstanding students from other post-secondary institutions with the pre-requisites and aptitudes outlined in Section 2.1 who seek admission to the program. The IBEHS+ program will consider these applicants on a case-by-case basis, including where transfer credits for courses already taken can be applied.

Level II Specialization

In addition to admission requirements outlined in Section 2.1, admission to Level II will also be open to a limited number of exceptionally qualified applicants who have completed the common Level I Engineering Program and wish to transfer to Level II of the IBEHS+ program. Consideration for admission requires successful completion of all non-elective Level I Engineering courses and submission of a supplementary application (see Section 2.1 above). Students will be able to seek equivalency for the IBEHS+ Level I Integrated Learning course based on their academic success in the following Engineering I courses: ENGINEER 1C03 (Engineering Design and Graphics), ENGINEER 1D04 (Engineering Computation), ENGINEER 1P03 (Engineering Profession and Practice), and MATLS 1M03 (Structure and Properties of Materials). Students who have not completed HTHSCI 1106 may either take the course in the summer term between Level I and Level II or during Level II.

In exceptional cases, there may be students from faculties outside of Health Sciences and Engineering with these prerequisites and aptitudes, and with a strong interest in the program. The IBEHS+ program will be an inclusive and open one that will evaluate such applications on a case-by-case basis. This approach will be facilitated by evaluation of statements of interest and interviews with short-listed applicants.
3. STRUCTURE

3.1 ADMINISTRATIVE, GOVERNANCE AND COMMUNICATION

The IBEHS+ program will be jointly administered by the Faculty of Health Sciences and Faculty of Engineering. Co-Directors of the Program, one representative from Faculty of Health Sciences and one representative from Faculty of Engineering, will coordinate the program, oversee the curriculum, teach within the curriculum, and provide student support and outreach leadership. In the latter function, this individual will liaise and coordinate with members of each faculty, as well as outside experts, both of whom will provide guest lectures and serve as mentors on multidisciplinary group projects. The Program Co-Directors will report to the Dean of their respective faculty, and will work in collaboration with the Associate Dean of Engineering (Academic) and the Associate Dean, Undergraduate Education (Faculty of Health Sciences). New Program Co-Directors will be selected every 5 years. All communications related to the program will originate from the Program Coordinator, Co-Directors or the Associate Dean in each Faculty.

The Program Operating Committee will be alternately chaired by each Program Co-Director. Members of the Operating Committee will include the Dean of each faculty, the Associate Dean of Engineering, (Academic), the Associate Dean of Undergraduate Education (Faculty of Health Sciences), four faculty members; two from the Faculty of Health Science and two from the Faculty of Engineering, and two students registered in the Program; one from each specialization. The function of the Operating Committee will be to develop curriculum recommendations for the IBEHS+ program.

The Program Policy Committee will be alternately chaired by the Dean of the Faculty of Engineering and Dean of the Faculty of Health Sciences. Members of the Policy Committee will include the Co-Directors of the Program, the Dean of the Faculty of Engineering when not serving as Chair), the Dean of the Faculty of Health Sciences (when not serving as Chair), the Associate Dean of Engineering (Academic) and the Associate Dean of Undergraduate Education (Faculty of Health Sciences). The function of the Policy Committee will be to consider and make recommendations regarding the operation of the Integrated Biomedical Engineering and Health Sciences Program; to recommend policy on admission numbers and major Program changes; and to consider proposals from the Director regarding policy decisions.

An Industrial Advisory Committee will be chaired by an external member of industry. Members of the Industrial Advisory Committee will include the Co-Directors of the Program, and senior industry representatives from the biomedical field. The function of the Industrial Advisory Committee is to provide feedback on the Program’s objectives and activities as they relate to current industry needs in the biomedical field; provide updates on technological advances as well as economic, societal, and cultural shifts; and secure connections to the engineering and health professions, industry, and government.

Proposed changes to the Program and curriculum are presented for approval to the Undergraduate Curriculum and Policy Committee of the Faculty of Engineering and the Faculty of Health Sciences Education Council where appropriate.
3.2 STRUCTURE AND REGULATION

Ensuring Achievement of Program Learning Outcomes

The Program Co-Directors will be primarily responsible for overseeing the IBEHS+ program in collaboration with the Associate Dean of Engineering (Academic) and the Associate Dean, Undergraduate Education (Faculty of Health Sciences), each of whom meet with their respective Curriculum and Policy Committees to assess the programs, courses and enrolments. The Program Co-Directors will be responsible for preparation of the documentation required for the cyclic IQAP reviews. The Associate Deans have open door policies and are tuned in to the needs of the students, graduates, teaching assistants and faculty. Based on feedback, the curriculum and/or the level of support and guidance will be routinely adjusted to meet the needs of the students, teaching assistants, faculty and the learning objectives of the program.

To ensure students are able to meet the specified Program Learning Outcomes, student progress will be reviewed at the end of each term by the Program Coordinator and each Program Co-Director. Students in the program who fail to maintain a minimum Grade Point Average of 8.0 (on the McMaster 12 point scale), or who have a grade below 6.0 in any one of the required program courses will be invited to meet with the Program Co-Directors to discuss areas of weakness and suggest remedial strategies. Review of grades will follow the standard McMaster practice for reviewing, with all internal reviews being handled by the Co-Directors of the program. The Program Co-Directors will also annually review performance of all students registered in the program; to make recommendations to each Faculty concerning the status of in-course students; and to recommend to each Faculty candidates for undergraduate degrees.

The Health Solutions Design projects integrate all program learning outcomes and will be used as an overall indicator of student performance.

Overview of Courses in the Program

The IBEHS+ Program will provide interdisciplinary education within biomedical engineering and health sciences in addition to specialized education within a parent discipline. All students in the IBEHS+ Program will take core courses that highlight the biomedical component of the program, with particular emphasis on innovation, translational design and research, biology and health, organic chemistry and biochemistry, biological systems, and biomedical technology. These core courses ensure that all Program Learning Outcomes for the program, as outlined in Section 1.4, are met. The Health Solutions Design Projects courses taken in each year of the program emphasize collaborating in multidisciplinary teams and applying translational design and research practices to offer innovative biomedical solutions to real-world healthcare problems. Accordingly, these courses, which are at the core of the IBEHS+ program, are very well aligned with the program’s overarching learning outcome, as outlined in Section 1.4.

Each course specific to the IBEHS+ program is offered at a level that is appropriate to each students’ expected knowledge base and provides the necessary content for each student to appropriately advance throughout the program. Regardless of the chosen discipline, enrolled students will have the necessary pre-requisites (from earlier core courses) to meet the learning outcomes for all IBEHS+ core courses.
Level I Program

Students admitted to the IBEHS+ Program will be enrolled in a common Level I program comprising 3 courses in Mathematics (9 units), 2 courses in Physics (6 units), 1 course in Biology (6 units), 1 courses in Chemistry (3 units), 1 course in Health Solutions Design Projects (10 units), and a complementary studies elective (3 units). An overview of Level I courses is shown in Table 9. The common workload of the Level I IBEHS+ program (37 units) is consistent with the common Level I Engineering program offered to all students seeking a B.Eng. degree.

Table 9. Courses in Level I of the IBEHS+ Program
(Core IBEHS+ courses are highlighted in the table)

<table>
<thead>
<tr>
<th>Level</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Status</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>BMDENG 1x10</td>
<td>Health Solutions Design Projects I</td>
<td>NEW</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>CHEM 1E03</td>
<td>General Chemistry</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 1I06</td>
<td>Cellular &amp; Molecular Biology</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>MATH 1ZA3</td>
<td>Engineering Mathematics I</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 1ZB3</td>
<td>Engineering Mathematics II</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 1ZC3</td>
<td>Engineering Mathematics II-B</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYSICS 1D03</td>
<td>Introductory Mechanics</td>
<td>Revised</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYSICS 1E03</td>
<td>Waves, Electricity and Magnetic Fields</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ELECTIVE</td>
<td>Complementary Studies</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Level II Specialization

Beyond Level I, students will enrol in either the BME specialization or the HEE specialization. Beginning in Level II, students in each specialization will be required to take a set of 19 common courses (58 units), which includes 5 Health Sciences courses (15 units), 4 science and math courses (12 units), and 10 core courses specific to the IBEHS+ Program (31 units). Included among the core IBEHS+ courses are a series of Health Solutions Design Projects courses offered in Levels II, III, and IV. These courses build off the Level I Health Solutions Design Projects course and place a strong emphasis on working in multidisciplinary teams towards innovation biomedical engineering solutions to real-world health care problems. Of the 10 core IBEHS+ courses offered in the IBEHS+ program, 2 are currently offered in the existing 4-year Electrical and Biomedical Engineering program and 1 is offered as an elective in the Mechanical Engineering program. These existing courses will be revised to fit the program learning outcomes of the IBEHS+ program. The remaining courses will be developed specifically for the IBHES+ program. Course descriptions for these core IBEHS+ courses can be found in Appendix H. An overview of these common courses is shown in Table 10.
Table 10. Common Courses in the IBEHS+ Program Beginning in Level II
(Core IBEHS+ courses are highlighted in the table)

<table>
<thead>
<tr>
<th>Level</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Status</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>BMDENG 2x03</td>
<td>Health Solutions Design Projects II</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 2F03</td>
<td>Inquiry in Biochemical and Molecular Biology</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 2F03</td>
<td>Human Physiology and Anatomy I</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 2F03</td>
<td>Human Physiology and Anatomy II</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 2Z03</td>
<td>Engineering Mathematics III</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 2ZZ3</td>
<td>Engineering Mathematics IV</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>III</td>
<td>BMDENG 3x03</td>
<td>Health Solutions Design Projects III</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BMDENG 3x03</td>
<td>Biomedical Signals and Systems</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 1AA3</td>
<td>Introductory Chemistry II</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 2A03</td>
<td>Health Sciences Biostatistics</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HTHSCI 3G03</td>
<td>Critical Appraisal of Medical Literature</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>BMDENG 4x03</td>
<td>Health Solutions Design Projects IV</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BMDENG 4x03</td>
<td>Biomedical Systems and Control</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BMDENG 4x03</td>
<td>Engineering Biostatistics</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BMDENG 4x03</td>
<td>Medical Imaging I</td>
<td>NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 2E03</td>
<td>Introductory Organic Chemistry</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ELECE 4BD4</td>
<td>Biomedical Instrumentation</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MECHENG 4BB3</td>
<td>Biomechanics I</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>V</td>
<td>ELECE 4BC3</td>
<td>Modelling of Biological Systems</td>
<td>Revised</td>
<td>3</td>
</tr>
</tbody>
</table>

Biomedical Engineering (BME) Specialization

Students enrolled in the BME specialization will pursue a 5-year Bachelor of Engineering (B.Eng.) degree. To meet degree requirements, students enrolled in this specialization must also be admitted to one of 8 Engineering disciplines (Chemical, Civil, Electrical, Engineering Physics, Materials, Mechanical, Mechatronics, or Software) at Level II. In addition to the common courses outlined in Table 10, students in this specialization will also be required to take discipline-specific courses in accordance with their chosen discipline. These courses provide the specialized education that is critical to the IBEHS+ Program, and are necessary to meet the Program Learning Outcomes for each Department. All students will also take at least 2 complementary studies electives (in addition to the elective taken in Level I) over the course of the program in order to meet the requirements of a Bachelor of Engineering degree. Table 11 summarizes a yearly breakdown of courses for students enrolled in the BME specialization. Since the number of courses and units in the BME specialization is unique to each engineering discipline, the average across the 8 disciplines is presented in the table.

In addition to the common courses listed in Table 10, all students in the BME specialization will also take a 6-unit Biomedical Design Capstone Project course. This course, taken over two terms in Level V, will be modeled after similar Capstone courses offered in other Engineering programs, but will emphasize Biomedical Design. All students in the BME specialization will also take at least 2 technical elective IBEHS+ courses towards the completion of their degree. These electives will be offered by each department in the Faculty of Engineering, with each department contributing two electives to the program. There will be lower-level technical electives available to all students, regardless of their chosen discipline and higher-level technical electives that will require either discipline-specific pre-requisites or permission of the department offering the course. Students in their 4th or 5th year will also have the option of serving as a peer mentor for the Level I or Level II Health Solutions Design Projects courses. The role of a peer mentor
will be to provide students both knowledge and guidance, but also a unique perspective on process. Students may choose this option in addition to their required two IBHES+ technical electives, but are also eligible to receive a 3-unit credit for one technical elective, provided all degree requirements are otherwise met. A preliminary overview of elective IBEHS+ courses is shown in Appendix I. The list of available electives will expand within the first 2 years of the program as new courses are developed.

A curriculum map for all disciplines (which includes both common and discipline-specific courses) can be found in Appendix J. The curriculum for each discipline within the BME specialization meets the university requirements in terms of minimum number of courses required. The total number of courses (common + discipline-specific) for Levels II-V average 10.5 – 12 per year (34-40 units per year), depending on the chosen discipline. This is consistent with the average annual workload of other programs offered through the Faculty of Engineering. As the IBEHS+ Program will be an accredited program, all core IBEHS+ courses will meet the requirements of the CEAB for the core engineering discipline and all students in the program will also meet the requirements for accreditation in Biomedical Engineering.

Table 11. Breakdown of common and discipline-specific courses for the BME specialization

<table>
<thead>
<tr>
<th>Level</th>
<th>Common Courses</th>
<th>Engineering Courses</th>
<th>All Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>6</td>
<td>5.5</td>
<td>11.5</td>
<td>18</td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>6.5</td>
<td>11.5</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>8*</td>
<td>3.5</td>
<td>11.5</td>
<td>25*</td>
</tr>
<tr>
<td>V</td>
<td>2*</td>
<td>8.5</td>
<td>10.5</td>
<td>6*</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>24</td>
<td>45</td>
<td>64</td>
</tr>
</tbody>
</table>

Average courses per year: 11.25 Average units per year: 38.5

*Included in the above table are 2 IBEHS+ electives (3 units each), one taken in Level IV and one taken in Level V. Additional electives may be taken depending on timetable availability and Departmental approval.

Health, Engineering and Entrepreneurship (HEE) Specialization

Students enrolled in the HEE specialization will pursue a 5-year Bachelor of Health Sciences (Health, Engineering and Entrepreneurship) degree. The proposed curriculum is grounded in a series of Health and Engineering Entrepreneurship courses (33 units) and Current Research Initiative courses (6 units). These courses will be developed specifically for the HEE specialization and will be offered in Levels II through V. The intent is to provide HEE graduates with core knowledge and competencies that will allow development of new health and BME private sector development in Canada. This requires knowledge in three areas, health, engineering and entrepreneurship as well as an understanding of uncertainty and risk-taking. In effect, the HEE stream is educating for new capabilities and the curriculum delivery supports this outcome (Fraser and Greenhalgh, Coping with complexity; educating for capability, BMJ 323(7316); 799-803, 2001). Course descriptions for the HEE courses can be found in Appendix H. An overview of these courses is shown in Table 12. The remainder of the curriculum will include existing courses currently offered in the Bachelor of Health Sciences Program and electives in each year to provide the flexibility to explore educational opportunities in engineering and the health sciences. Among these electives include courses offered by the Faculty of Health Sciences as well as IBEHS+ electives described above. In addition, students in either their 4th or 5th year in the program may receive a 3-unit credit for serving as a peer mentor for the Level I or Level II Health Solutions Design Projects courses. The role of a peer mentor will be to provide students both
knowledge and guidance, but also a unique perspective on process. Table 13 summarizes a yearly breakdown of courses for students enrolled in the HEE specialization.

Table 12. New Courses in the HEE Specialization

<table>
<thead>
<tr>
<th>Level</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Status</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>HTHSCI 2x06</td>
<td>Health and Engineering Entrepreneurship I</td>
<td>NEW</td>
<td>6</td>
</tr>
<tr>
<td>III</td>
<td>HTHSCI 3x06</td>
<td>Health and Engineering Entrepreneurship II</td>
<td>NEW</td>
<td>6</td>
</tr>
<tr>
<td>IV</td>
<td>HTHSCI 4x06</td>
<td>Health and Engineering Entrepreneurship III</td>
<td>NEW</td>
<td>6</td>
</tr>
<tr>
<td>V</td>
<td>HTHSCI 5x15</td>
<td>Health and Engineering Entrepreneurship IV – Thesis</td>
<td>NEW</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>*HTHSCI 5x06</td>
<td>*Current Research Initiatives</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

*The Current Research Initiatives course will be taken across the entire HEE specialization, with 1.5 units in each year from Levels II-V.

A curriculum map for the Health, Engineering and Entrepreneurship specialization can be found in Appendix J. The curriculum for the Health, Engineering and Entrepreneurship specialization meets the university requirements in terms of minimum number of courses required. The total number of courses (common + discipline-specific) for Levels II-IV average 10 per year (30 units per year) with a slightly lower number of courses in Level V to accommodate the 15-unit senior Entrepreneurship course. This is consistent with the average annual workload of the Bachelor of Health Sciences program (30 units per year) offered by the Faculty of Health Sciences.

Table 13. Breakdown of common and Health Sciences courses for the HEE specialization

<table>
<thead>
<tr>
<th>Level</th>
<th>Health, Engineering and Entrepreneurship Specialization</th>
<th>Health Sciences</th>
<th>All Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Courses</td>
<td>Common</td>
<td>Health Sci.</td>
<td>All</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>6*</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>2*</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>20</td>
<td>17</td>
<td>37</td>
</tr>
</tbody>
</table>

Average courses per year: 9.25 Average units per year: 31.75

*Students in the HEE specialization will take electives in each year of the program offered either by the Faculty of Health Sciences or the IBEHS+ program. IBEHS+ electives (3 units each) can be taken in Level IV or V.

Optional Co-Op Program

Undergraduate students in either specialization can enroll in a Co-op or in a non-Co-op version of each specialization. Students enrolled in the former will be required to complete 12 months of industrial/practical experience prior to graduation. Students may enter the Co-op version of their program at any time up to the beginning of Term 2 of their next-to-last level of undergraduate studies. As well as completing the academic requirements in accordance with the chosen specialization outlined above, students who opt to enrol in a Co-op program must complete an introductory Co-op program course, ENGINEER IEE0. This 0-unit orientation course covers self-assessment exercises, job and employer research, cover letter and resume writing, interviewing skills and work place professionalism.

Ensuring Student Progression

Throughout the IBEHS+ program, students will take a series of common courses in addition to courses within their chosen specialization and discipline. Included among these common courses are core courses unique to the IBEHS+ program. These core IBEHS+ courses will be offered in each year to ensure students remain continually engaged with the biomedical aspect of
the program. Among the core IBEHS+ courses is a series of Health Solutions Design Projects courses, offered once per year beginning in Level I. In each course, students will be faced with one or more problems related to the biomedical field. Each course will build off the learning outcomes from the previous course, and the projects will become more independent and open-ended as the students’ progress through the program. The purpose of the interdisciplinary projects is to ensure continuity throughout the program while offering students from different disciplines the unique opportunity to share their learned knowledge with each other in solving real-world health care problems.

3.3 PROGRAM LENGTH & PROGRESSION

To achieve the central goal of the program, a 5-year structure is proposed.

For the BME specialization, five years is necessary to ensure students receive: 1) the foundational knowledge in both the basic sciences and health sciences, 2) the interdisciplinary breadth of knowledge in biomedical engineering, and 3) the specialized disciplinary depth required for licensure in a parent engineering discipline. The Faculty of Engineering already has a history of offering breadth and depth in 2 disciplines through its highly successful Engineering and Management program. Furthermore, many students enrolled in the existing 4-year Electrical and Biomedical Engineering program decide to take an additional year (5 years in total) to complete the program.

For the HEE specialization, five years provides students with: 1) the necessary knowledge in the math and sciences that relates to the groundwork for a biomedical engineering education, 2) a core knowledge in health, and 3) a firm grounding in business and entrepreneurship as it relates to these disciplines.

4. CURRICULUM AND TEACHING

4.1 PROGRAM CONTENT

Students enrolled in the IBEHS+ program will take common courses related to biomedical engineering and the health sciences, regardless of their chosen specialization (refer to Section 3.2 and Appendices I-M for curriculum details). Among these common courses is a series of four Health Solutions Design Projects courses, which will make up the core of the IBEHS+ program and are very well aligned with the program’s overarching learning outcome, as outlined in Section 1.4. Through experiential learning, students will be exposed to real-world problems in healthcare, fostering knowledge and problem solving skills that are unique to a multidisciplinary working environment.

Students will first be exposed to problems of an interdisciplinary nature through Health Solutions Design Projects I. Working in groups, students will be faced with 5 short projects that are interdisciplinary in nature, with each project focusing on a unique real-world healthcare problem. Groups will develop innovative biomedical engineering solutions to these problems through exposure to a variety of engineering topics, including design and graphics, materials design and selection, computation, and ethics and professionalism. Early projects will be well-
structured with known solutions, and the projects will become increasingly more challenging and open-ended as the course progresses. For each project, groups will draw on resources provided by faculty member mentors as well as the scientific literature, and will communicate their findings to their peers and experts. Faculty members will be chosen to mentor a particular project based on their experience and expertise in their respective fields, and will receive teaching credit for mentorship to ensure they are not overworked and can appropriately dedicate their time to meet the needs of the students. As this course is experiential in nature, a strong emphasis will be placed on creativity and reflection, and students will be encouraged to work through their own process of self-discovery without excessive judgment.

Beginning in Level II and continuing on through Level IV, students will gain continued exposure to real-world problems in healthcare through the subsequent Health Solutions Design Projects courses. Each course will present a unique healthcare problem encompassed within an interdisciplinary group project. This ensures that, over the duration of the IBEHS+ program, students are exposed to a wide spectrum of topics related to the biomedical field. A strong emphasis will also be placed on the importance of communication and interpersonal skills within a multidisciplinary environment, and these skills will be continually reinforced. Rather than allowing students to gain a sense of comfort working with the same individuals, groups will be re-arranged for each project. As these projects are interdisciplinary in nature, success will ultimately depend on the ability of students from different specializations, and often with different personalities and skill sets, to work together, sharing their knowledge and exchanging ideas to develop workable biomedical engineering solutions.

Two important goals of these Health Solutions Design Projects courses are: 1) engage students in purposeful endeavours, and 2) create an emotional investment. To accomplish these goals, the design projects will be continuously reviewed and modified to ensure students stay current on emerging data in the biomedical field.

4.2 PROGRAM INNOVATION

Integrating Engineering with the Health Sciences

The Faculty of Health Sciences has been at the forefront of education since the 1960s. Problem-Based Learning and Inquiry form the core pedagogical frameworks that have been adopted and adapted by hundreds of other schools worldwide. The proposed new program offers an opportunity for more formal integration of these pedagogies between two faculties.

The 5-year Integrated Biomedical Engineering and Health Sciences Plus program will be the first of its kind in Canada to offer an interdisciplinary education that integrates engineering with the health sciences. McMaster University has been at the forefront of biomedical engineering education, with its 4-year Electrical and Biomedical Engineering program being one of the first biomedical engineering programs to be offered in Canada. Our experience has taught us that there exists a need for a 5-year biomedical program that provides an interdisciplinary biomedical engineering education in addition to specialized training within a parent discipline. Not only will this program replace the existing 4-year electrical and biomedical program, but it also be rolled out to the remaining engineering programs as well as the Faculty of Health Sciences, thus attracting students who with a diversity of interests and aptitudes. In doing so, this program can be seen as a true integration of students from different specializations who are brought together to share knowledge and offer biomedical engineering solutions to real-world healthcare problems.
Therefore, the group of students enrolled in the program will be a true reflection of the multidisciplinary nature of the biomedical engineering and health sciences field.

**Health Solutions Design Projects**

Among the core IBEHS+ courses is a series of Health Solutions Design Projects courses, offered once per year beginning in Level I. The Health Solutions Design Projects courses will expose students to a wide spectrum of real-world healthcare problems. Working in multidisciplinary teams, students will apply translational design and research practices to offer innovative biomedical solutions to real-world healthcare problems. In each course, students will be faced with one or more problems related to the biomedical field. Each course will build off the learning outcomes from the previous course, and the projects will become more independent and open-ended as the students’ progress through the program. The purpose of the interdisciplinary projects is to ensure continuity throughout the program while offering students from different disciplines the unique opportunity to share their learned knowledge with each other in solving real-world health care problems.

A proper interdisciplinary education such as the one offered through the IBEHS+ program requires participation from faculty who not only have a biomedical background, but can also offer specialized knowledge from diverse elements of engineering and health sciences. While the program will consist of full-time faculty who are committed to teaching in the program, there will also be faculty across the 7 engineering departments as well as the Faculty of Health Sciences who will be important participants in the Health Solutions Design Projects courses. As thought-leaders in their respective fields, these faculty members will serve as mentors for the various interdisciplinary projects, providing a source of knowledge as well as guiding students through the intricacies of multidisciplinary group work. Faculty members will be chosen to mentor a particular project based on their experience and expertise in their respective fields. The faculty who will contribute to this program are diverse in not only their areas of expertise but also experience, providing students with a multitude of intellectual knowledge to draw upon. Faculty mentors will be assigned and agreed upon at the beginning of each academic year, with faculty receiving teaching credit for mentorship to ensure they are not overworked and can appropriately dedicate their time to meet the needs of the students.

Two important goals of these Health Solutions Design Projects courses are to: 1) engage students in purposeful endeavours, and 2) create an emotional investment. To accomplish these goals, the design projects will be continuously reviewed and modified to ensure students stay current on emerging data in the biomedical field.

**An Entrepreneurship Core in the Health Sciences**

Entrepreneurship curricula and experiential learning will be explored each year in the Health, Engineering and Entrepreneurship specialization. These courses will represent a continuum of learning opportunities from Level II through Level V; 20 percent of curriculum in Levels II-IV and 50 percent in Level V. Learning, application of learning and group work will not be reported as grades after each year. Rather, students will maintain a learning portfolio that describes knowledge acquisition, relational elements between knowledge areas and future opportunities. This will be evaluated in Level V and students will discuss the work with a committee. This will allow students to focus on learning with feedback rather than grades as this element develops.
Peer Mentoring and Collaboration

A major strength of this program is the emphasis on mentorship. Through the Health Solutions Design Projects courses, students will receive mentoring at three levels: faculty, graduate students, and peers. Peer mentoring will be provided by senior-level students who have already completed the course. The role of these peer mentors will be to provide the students both knowledge and guidance. Additionally, they will also offer a unique perspective on process, as they will have already met similar challenges the students will be faced with. This peer-mentoring opportunity will be available to 4th and 5th year students in the form of a 3-unit elective course. Students may choose this option in addition to their required technical electives, but are also eligible to receive credit for one technical elective, provided all degree requirements are otherwise met. Peer-mentoring serves as an important bridge between senior-level and junior-level students, giving junior-level students a valuable resource to draw upon, and giving senior-level students who serve in this mentoring capacity some perspective on how far they have come along since entering the program.

Unique Approaches to Teaching and Learning

The IBEHS+ program will be at the forefront of innovative teaching and learning practices, led by the Health Solutions Design Projects courses. These courses are designed around multidisciplinary group projects, and will be experiential in nature. While there is a necessity for didactic teaching methods in the delivery of core engineering knowledge, particularly in Level I, students will be exposed to biomedical concepts and problems primarily through project-based learning. This experiential approach to learning will require that students, working in groups, produce a biomedical engineering solution to a real-world healthcare problem. Many projects will require groups to create a tangible device, and demonstration of its functionality to a select group of experts will be among the required project deliverables. To facilitate this experiential learning component of the program, students will have access to studio workspace where they can brainstorm ideas, design and model concepts, and finally, build functioning prototypes.

Blended learning and technology-enhanced learning principles will also be embraced in order to improve access to the instructor and mentoring faculty outside of the classroom. Examples of these include, but will not be limited to, online discussions and seminars via social media, online lecture videos posted ahead of class, and interactive polls and questionnaires held inside and outside the classroom. In adopting these approaches, we hope to open up classroom time for interactive discussions and engagement between the faculty and students. Opening up classroom time will also allow us to additionally focus on problem-based and inquiry-based learning principles. These student-centric learning principles stimulate the student to become active with the subject matter, placing a strong emphasis on reflection and exploration. These approaches to learning should provide a rich-environment for student-focused learning and have already enjoyed highly successful use in the Faculty of Health Sciences for 45 years.

To allow students to relate their learning across course boundaries, students in the IBEHS+ program will develop their own Personal Learning Portfolio and contribute to it throughout the duration of the program. As a component of the Level I Health Solutions Design Projects course, students will be mentored on creating their own Learning Portfolio by the course facilitators. Students will be required to contribute to their Learning Portfolio in all IBEHS+ courses as they progress through the program, providing them a unique opportunity to track their own progression. The Learning Portfolio will serve as an overriding method of assessment, with all assessment methods (outlined in Section 5.1) included within it. Students will use the Learning Portfolio to reflect on: 1) their learning experiences and how they have changed their perception of engineering
and health, and 2) their understanding of the problem-solution paradigm. As it pertains to the Health Solutions Design Projects courses, the Learning Portfolio will expand with the completion of each project, becoming a more important resource to the student in guiding them through the design process and the intricacies of multidisciplinary group work.

The Faculty of Health Science programs integrate inquiry learning at all levels and formally require the acquisition of group work competencies by students. This is facilitated in an age and stage specific manner supported by group-work peer tutor programs. The Bachelor of Health Sciences (Honours) program utilizes a full range of evaluation methods that meet course requirements and specific learning outcomes. The program underwent an IQAP review last year and the reviewers commented that ‘This is an impressive program, not only for its attention to principles of PBL and aligned curricula, but also for its attention to the developmental arc of its learners. It assumes that students can achieve excellence in a motivated and intentional fashion and it puts in place the structures to support this outcome. The scaffolding and mentoring are further supplemented by a governance structure that embeds consultation and ongoing curriculum development into its equally sustainable structures of pedagogy and course development.’

These approaches to teaching and learning, while not unique to McMaster, are consistent with the University’s aspiration to create an extremely high-quality learning experience, as outlined in President Deane’s letter to the McMaster community, Forward with Integrity.

4.3 MODE(S) OF DELIVERY

Educational offerings in the proposed IBEHS+ program will focus primarily on face-to-face interactions between the students and instructors. This includes classroom instruction to the full cohort of students and laboratory and tutorial instruction to smaller groups of students.

Classroom instruction will combine various learning principles in order to provide a unique and invigorating learning experience. Multiple methods will be used, from more traditional didactic teaching methods, to blended learning (i.e., increased availability of online content) and student-centric learning (i.e., problem-based, inquiry-based, experiential etc.).

- **Didactic Methods:** as with any education, there is a significant amount of theoretical knowledge that must be transferred to the student, and didactic teaching is the most effective method to accomplish this within an appropriate timeframe. Faculty make sense of concepts that have proven difficult in the past. However, the application of the theory will be stressed in order to provide insight on its significance.

- **Student-Centric Learning:** active approaches to learning that are focused on the student rather than the teacher are necessary to transform theoretical knowledge into practical knowledge, by stimulating the student to become active with the subject matter in a perceptive, reflective, and explorative way. Included among these principles will be problem-based and experiential learning, already used with considerable success in various Level I Engineering courses; and inquiry-based learning, which has been the core of the Bachelor of Health Sciences Program.

- **Blended Learning:** we understand that all students learn differently, and will therefore incorporate blended learning through increased availability of online content. By offering online content to complement the classroom component, students will not only have better access to course resources, but they will also be able to have a degree of control over when
the content is learned. This will also allow for more student-centric learning principles to be incorporated into the classroom.

This varied approach to teaching is the most appropriate method of delivery for this particular curriculum, and will ensure students achieve the proposed learning outcomes as well as improve the student learning experience. This integration of passive and active teaching methods is a reflection of the multidisciplinary education we will be delivering to the students.

Classroom instruction will be provided to the full cohort of 140 students. Although teaching to a class of 140 students is not without its challenges, especially as it relates to applying experiential or problem-based learning, we feel it is important to keep the cohort together as a single unit as much as possible in order to build a sense of community and promote interactions between students across the various disciplines. Many courses will incorporate formal group work and larger classes will be divided into groups of five.

Laboratory and tutorial instruction will be provided to smaller groups of students, ranging between 15-50 students per session. These modes of delivery will be used to teach important skills and concepts in a more intimate setting that encourages open discussion and interactions between student and instructor, as well as among students. Where appropriate, blended learning will also be utilized to provide students ample opportunity practice application of the skills and concepts they have been taught. For the Health Solutions Design Projects courses, tutorial sessions will be serve as studio time for students to meet, discuss ideas, and interact more closely with course facilitators. To ensure intellectual quality of the student experience, these sessions will be facilitated by a teaching assistant (TA), faculty members from both Engineering and the Health Sciences, and senior-level students (4th or 5th year) serving as peer mentors. The peer mentors (described in Section 4.2) will complement the TAs and faculty mentors by providing a unique perspective on process, in addition to both knowledge and guidance, as they will have previously met similar challenges the current students are faced with. This complement of faculty, TAs and peer mentors will reduce the student-to-mentor ratio, and improve the overall student experience.

The modes of delivery outlined above requires both large (~150 student capacity) and small (<50 students) classrooms for the delivery of course material and devoted studio time. Laboratory time for the Level I Health Solutions Design Projects course requires access to a computer lab with at least 35 computers. Full details on how these requirements will be met is described in Section 6.1 (Physical Resources).

4.4 EXPERIENTIAL LEARNING

Health Solutions Design Projects

Experiential learning is an integral component of the program, and will play a significant role in the Health Solutions Design Projects courses offered in Level I through Level IV. For these courses, experiential learning will be implemented through a series of multidisciplinary group projects. The experiential learning component will carry a weight ranging from 25-100%, depending on the year the course is offered. Details of how experiential learning opportunities will be arranged and integrated into these courses is discussed in Sections 4.1 and 4.2, as well as the course descriptions (Appendix H).
Biomedical Capstone Design Project (BME Specialization)

Students in their final year of the BME specialization will complete a 6-unit undergraduate Capstone design project course. This course will be modeled after similar Capstone courses offered in other Engineering programs, but will emphasize Biomedical Design. Working directly under the supervision of a faculty member, students will spend most of their efforts researching and designing a solution to a biomedical problem. Faculty members will come up with a list of potential group projects. Care will be taken to ensure there are sufficient project opportunities (both in number and diversity) for all students. Project ideas will be presented to the students in a form of a one-page abstract. Students interested in a project will meet with the appropriate faculty member to gain additional information and possibly discuss ideas. Students will then provide a ranking of preferred projects, which will be used, in part, to determine the assignment of projects. All course deliverables will be related to the design project. Depending on the chosen project, experiential learning will make up 50-100% of course credit. This course will be conducted over the fall and winter semesters.

Health, Engineering and Entrepreneurship Capstone (HEE Specialization)

Students in the final year of the HEE specialization will complete 15 units of entrepreneurship that builds on 18 units offered in the preceding three years. The entrepreneurship courses require the attainment of competencies as outlined in Section 1.5. The experience will emphasize the development of products or services that add value and will focus on creation of new private sector opportunities in health and engineering. Students will be supervised by faculty members, members of the legal and business communities and informed community members.

Co-Op Program

Undergraduate students in the program can enroll in a Co-op or in a non-Co-op version of either the BME or HEE specialization. Students enrolled in the optional Co-op version will be required to complete 12 months of industrial/practical experience prior to graduation. Students may enter the Co-op version of their program at any time up to the beginning of Term 2 of their next-to-last level of undergraduate studies. The Co-op program is optional, and students who for whatever reason cannot complete their co-op requirements may still graduate but without the Co-op designation on their transcripts. Students who have partially completed the Co-op requirements will not receive a Co-op designation but will have the experience acknowledged on their transcript.

4.5 ACCESSIBILITY

The IBEHS+ program is a collaborative effort by the Faculty of Engineering and Faculty of Health Sciences, both of which strive to meet the needs of its students, staff and faculty in terms of accessibility. Every effort will be made to ensure the program meets the expectations of the university in terms of accessibility.

Teaching Accessibility

Courses will be designed and delivered with a diversity of instructional methods in mind in order to create an inclusive and accessible classroom environment. For each course, a course syllabus including a statement regarding the duty to accommodate students with disabilities, and a complete course reading list will be provided prior to the beginning of the term. Lecture material as well as other course content (e.g., assignments, supplementary materials, etc.) will be made
available electronically, and appropriate practices will be followed to ensure accessibility (please refer to http://accessibility.mcmaster.ca). To ensure principles of Universal Design are followed, alternative formats to online content will be provided as needed. Should individuals require one or more assistive technology in the classroom, faculty and staff will work with these individuals to ensure appropriate accommodations have been made.

Creating Accessible Websites and Digital Media

Much of the course content will be made available through digital media (e.g., lecture slides, videos and animations, PDF documents, etc.) and online content will be offered to complement the classroom component. Appropriate accommodations with respect to graphics and website presentation, presentation tools, videos and animations, audio recordings, and other media (PDFs, documents, etc.) will be made to ensure there are no barriers created for students with disabilities.

Accommodation

Both the Faculty of Engineering and Faculty of Health Sciences recognize that individuals may require some adjustments in order to support their performance in the classroom. The IBEHS+ program will work with the individual seeking accommodation to ensure the university’s goal of accommodation is maintained, understanding that the nature of the accommodation is specific to the individual and will be determined on a case-by-case basis. For events, whether they be related to course content (e.g., exams, oral presentations, etc.) or extra-curricular, a Faith and Spirituality Day Calendar will be consulted to ensure the proposed date of event(s) will not conflict with observance days that could affect participation.

4.6 RESEARCH REQUIREMENTS (IF APPLICABLE)

Biomedical Engineering (BME) Specialization

The BME specialization requires completion of a 6-unit Biomedical Capstone design project under the supervision of a faculty member who is a core member of one of the Departments in the Faculty of Engineering. This project will be conducted over the fall and winter semesters. While the Biomedical Capstone is fundamentally a design course involving multidisciplinary group work, all projects will include a research component where students will be individually required to: 1) submit a proposal for the work they expect to conduct complete with an extensive review of the relevant literature, and 2) review and set goals in collaboration with group members and the supervisor on a regular basis. As a group, students will be required to present the results of their work and submit a final written report at the end of the semester. Beyond these minimal requirements, any additional research component(s) will depend on the chosen project and be determined by the faculty supervisor with approval from the Program Director and the respective Department Chair.

Health, Engineering and Entrepreneurship (HEE) Specialization

Students in HEE will complete the interdisciplinary projects each year alongside the 4-year entrepreneurship curriculum. The added value of a university degree lies in the ability of faculty and students to meet and challenge each other. Research is a critical component of this challenge and is interpreted broadly as discovery of existing and new knowledge. In the health science programs, textbooks are generally not used. Rather, students seek primary sources of information to construct knowledge under the guidance of faculty members. Students can also engage in
primary research in optional health science project courses. These involve work with faculty members in their research laboratories.

5. ASSESSMENT OF LEARNING

5.1 METHODS OF ASSESSING STUDENTS

Several methods will be used for assessing students throughout the program, and will vary based on the course and the level at which it is offered. These methods of assessment include:

- Formative and summative testing and examination
- In-class and take-home assignments
- Laboratory reports
- Formative feedback (e.g., progress meetings, peer evaluation, etc.)
- Self-evaluation
- Written proposals and reports
- Oral presentations and demonstrations

The assessments listed above will form part of the students' Personal Learning Portfolio, which will serve as an overriding assessment for the whole program. The Learning Portfolio will be first introduced in the Level I Health Solutions Design Projects course, and students will contribute to it throughout the program. The Learning Portfolio will serve as a program anchor, allowing students to relate their learning across course boundaries.

IBEHS+ Program: Common Courses

For most of the common courses offered in the program, assessment of learning will primarily rely on summative tests and exams that measure recall of content and application of knowledge (refer to Table 9, Table 10 and Table 12). In-class assignments, take-home assignments, and laboratory reports will also be used where appropriate. These assessments are consistent with similar courses that are primarily based on theoretical knowledge.

The four Health Solutions Design Projects courses offered from Level I through Level IV will measure recall of content and application of knowledge through a combination of regular formative and summative testing. These types of assessment are selected in order to monitor student progress, evaluate student learning, and improve student attainment. In addition to these assessments, the Health Solutions Design Projects courses will also assess comprehensive knowledge through a series of multidisciplinary group projects. These projects require creative problem-solving, deep learning and critical thought, and will place a strong emphasis on teamwork and collaborative skills. These skills will be assessed through formative feedback and self-evaluation. Formative feedback will be provided through peer evaluation, and through progress meetings with the instructor(s), teaching assistants and/or faculty mentor(s). Given that these particular skills are challenging to quantify, we feel that a proper assessment requires an amalgamation of evaluations and feedback from multiple sources. Students will also be evaluated through written proposals and reports, and oral presentations and demonstrations. The exact method of assessment will vary by project so that students develop a more diverse set of written and oral communication skills. These types of assessment are important since these skills need to be practiced and developed in order to prepare graduates for career success.
Biomedical Engineering (BME) Specialization: Capstone

Level V of the BME specialization requires completion of a 6-unit Biomedical Capstone design project. Students will be evaluated primarily through written and oral presentations. This assessment of learning is consistent with Capstone courses in other Engineering departments.

Health, Engineering and Entrepreneurship (HEE) Specialization: Entrepreneurship

The Faculty of Health Sciences uses all of the assessment practices described above with formal evaluation of group work as an additional strong component. Evaluation is grounded in evidence-based practice from the education and cognitive sciences literature. Summative evaluation in the HEE Level V entrepreneurship course will utilize formal evaluation of learning portfolios, oral presentations and committee defences.

5.2 CURRICULUM MAP

The proposed assessment practices outlined in Section 5.1 were chosen to provide a diverse selection of both qualitative and quantitative measures of student learning across the IBEHS+ common curriculum. The common curriculum can be divided into courses that focus on: 1) the basic sciences, 2) knowledge of health and the human body, 3) biomedical engineering knowledge, and 4) Health Solutions Design Projects.

Courses focused on core theoretical knowledge in the basic sciences, the health sciences, and biomedical engineering (Table 9 and Table 10) are primarily assessed using a combination of summative tests and examinations, assignments, and laboratory reports. The basic science courses form much of the foundation of knowledge for the program as a whole, with many of them being taught in Level I. These courses and their corresponding assessment practices are aligned entirely with PLO A1. Likewise, both the health sciences courses and the biomedical engineering courses are also aligned with this same Learning Outcome (PLO A1). However, the health sciences courses (offered in Levels I, II and III), which place a strong emphasis on applied knowledge of health and an understanding of determinants of illness and disease, are also strongly aligned with PLO A2 and PLO A3. Similarly, the biomedical engineering courses (offered in Levels III, IV and V), which place a strong emphasis on identifying and solving problems related to engineering and health, are strongly aligned with PLO A5. At least 3 of these core courses will be taught to each of the Learning Outcomes, either partially or fully, thus ensuring each Learning Outcome is appropriately measured. To ensure the intended PLOs are attainable, summative assessments (each at a weight less than the final assessment at the end of the term) will be used at the conclusion of each unit, allowing students to track their progress through the term and make adjustments, if necessary.

The Health Solutions Design Projects courses focus on the development of soft skills, including but not limited to, creative problem-solving, deep learning, critical thinking, teamwork and communication. To ensure these skills are properly assessed, a diverse selection of measures, both formative and summative, will be used. These measures of assessment include formative and summative testing, formative feedback, self-evaluation, written reports, and oral presentations. Formative and summative testing align with PLO A4 and PLO A11. Formative feedback aligns with PLO A6, PLO A7, PLO A9, PLO A10 and PLO A12. Self-evaluation aligns with PLO A7, PLO A9, PLO A10 and PLO A12. Written reports align with PLO A4, PLO A6, PLO A8, PLO A11, and PLO A12. Finally, oral presentations align with PLO A4, PLO A6, and PLO A8. All Health Solutions Design Projects courses will teach to each of these Learning Outcomes, either
partially or fully, ensuring all Learning Outcomes are appropriately measured in each year of the program. Formative feedback ensures each of the Learning Outcomes is attainable. Used throughout the term, this feedback is intended to regularly update the student on their progress in the course. If necessary, students who are struggling can be provided with the resources necessary to help guide them back on the correct path. Students in the Biomedical Engineering specialization will also a Biomedical Capstone course in their fifth year. Assessment of this course will be similar to the Health Solutions Design Projects courses, and will include formative feedback, self-evaluation, written reports, and oral presentations. These assessments align with PLO’s A6–A10.

Courses in the Health, Engineering and Entrepreneurship (HEE) specialization are intent on providing graduates with core knowledge and competencies that will allow development of new health and BME private sector development in Canada. This requires knowledge in three areas, health, engineering and entrepreneurship as well as an understanding of uncertainty and risk-taking. To ensure these skills are properly assessed, a diverse selection of measures will be used. This includes formative and summative feedback, peer- and self-evaluation, short tests, and oral reports. All of these assessments will be included as part of the students’ personal learning portfolio, which will be maintained through the program. Each of these assessments aligns with all four learning outcomes for the HEE specialization (PLO H1, PLO H2, PLO H3 and PLO H4).

A breakdown of assessments for each course, as well as a course-by-course mapping of these assessments to the program learning outcomes can be found in Appendix K.

5.3 DEMONSTRATING STUDENT ACHIEVEMENT

Defining Success

The IBEHS+ program will be externally evaluated during cyclical reviews, and assessed on an ongoing basis through indicators such as student grades and awards data. The program will define success by the reputation it establishes in biomedical engineering education locally, nationally and globally. The ultimate goal here is to be recognized as a leader in this field through a cutting-edge interdisciplinary approach that serves as a model for success in higher education. Based on this definition, student success will be determined by: 1) the level of achievement of its students, in-program and five years post-graduation, and 2) their degree of satisfaction with the program, in-program and five years post-graduation. Student achievement and satisfaction will be assessed both during the program as well as beyond graduation.

Key Assessment Pieces

The level of student performance will be assessed throughout the program through a combination of formative and summative measures (Section 5.1). Many of the key assessment practices the program emphasizes will come from the Health Solutions Design Projects courses in the form of formative assessment. Formative testing will be carried out through the duration of each course, which is of value to both the students and instructors. The continual use of formative testing provide students with feedback on their own progress, helping them identify their strengths and weaknesses and target areas that need work. From the perspective of the instructors, it will help recognize where students are struggling and address problems immediately. It can also help identity key areas of the program that might require modification, whether in content or delivery. Any changes to the program that are implemented can then be more readily evaluated in terms of how they impact student learning.
In addition to formative testing, students will also receive formative feedback throughout each Health Solutions Design Projects course. Formative feedback will be provided by the faculty as well as by the students’ own peers. This feedback will be specifically related to the learning and design projects that form the foundation of these courses. With each project, the composition of the groups and the mentor whom they work under will change, ensuring students receive unique feedback for each project. In addition, students will also be required to reflect on their own progress and contribution through self-evaluation. In all, these assessment practices are intended to help students appreciate and better understand how their efforts and contributions are seen by the faculty, by their peers, and by themselves. Through this arrangement, students can more readily identify how well the peer and mentor feedback falls in line with their personal view of their own strengths and weaknesses. Any discrepancies between these sources of feedback can thus be used as a springboard for open discussion that will hopefully contribute to improving not only academic outcomes, but more importantly, soft skills that are critical to a successful career.

Although formative testing and formative feedback is not necessarily innovative, the innovation lies in the continuity of these assessment practices throughout the program.

**Documenting and Communicating Evidence of Student Achievement**

The key assessment pieces outlined above combined with the summative measures from all courses in the program will provide the necessary evidence demonstrating that students have met the program learning outcomes.

**McMaster Graduate Attributes Assessment Process**

The McMaster Graduate Attributes Assessment Process will serve as the primary means for assessing and documenting student achievement. This process was developed by the Faculty of Engineering over a six-year period to meet the requirements of CEAB accreditation, and is currently in place to document and assess academic quality across all engineering programs. Implementation of this process within the IBEHS+ program requires indicators to be mapped to the curriculum, taking care to ensure that the proposed curriculum sufficiently measures all indicators. A set of indicators for each CEAB graduate attribute have been previously defined according to the following criteria: 1) they collectively meet the essential elements of each graduate attribute, 2) they account for any McMaster specific interpretations of the attribute, and 3) they are sufficiently granular to allow instructors to identify specific deficiencies in student learning. The complete list of indicators for each graduate attribute is listed in Appendix B and have also been mapped to McMaster UDLEs. Graduate attributes are essentially program level learning outcomes and indicators are course level learning outcomes or categories of learning outcomes which contain course level learning outcomes.

Once indicators are mapped to the IBEHS+ curriculum, academic quality is documented and assessed through two stages: 1) measurement process, and 2) continuous improvement.

**Measurement Process:** the measurement process is defined as follows:

- Based on curriculum mapping, courses in which specific indicators will be measured are defined for each engineering program
- Instructors will develop/modify rubrics for each indicator to be measured including specific reference to learning activity chosen for measurement
- The assessment activity and the method are chosen by the instructor
  - Activities will include assignments, mid-terms, oral presentations and exams
Performance is evaluated using a blend of assessment by the instructor, by TAs, by Peer or self-assessment

- Students performance for a particular indicator is categorized as either: “Exceeds Expectations”, “Meets Expectations”, “Marginal”, or “Below Expectations”, and the percentage of students in each category recorded
- Instructors complete a graduate attributes measurement report evaluating the results of their measurements and recommending steps for improvement
  - These reports are stored in a database and constitute the first steps in a continuous improvement process

**Continuous Improvement:** instructors submit graduate attribute measurement reports to an attributes committee that reviews the findings and accept or modify the actions proposed and identify any program level issues. There are four categories of actions that can be taken as a result the measurement process:

- Curriculum changes to address deficiencies in coverage identified by curriculum mapping
- Improvement of measurement process due to experience and input from external parties
- Course level changes in content or delivery to improve performance on specific indicators
- Program level changes deemed necessary from a program wide view of performance against specific indicators

The attributes committee discuss the findings with a stakeholder committee which includes faculty, students and alumni/industry. The stakeholder committee offers feedback on the approach taken by the program. Any necessary curriculum changes are proposed to the Curriculum Committee of each faculty. Instructors assess the effect of course level changes in the subsequent academic year. The attributes committee evaluates the effect of any program level changes based on subsequent measurement rounds. As an additional step to document and demonstrate academic quality of the program, a high level summary of recommendations and actions will be submitted to each Faculty Curriculum Committee for audit purposes.

**Learning Portfolios**

Evidence of student achievement will also be documented and communicated via Learning Portfolio’s that students will contribute to in each year of the program (refer to Section 4.2). The Learning Portfolio will serve as a program anchor, allowing students to relate their learning across course boundaries. By having all these documents available in one location, students can better reflect on their progress and work towards self-improvement in areas of weakness.

**Determining Success beyond Graduation**

Beyond graduation, we will judge success by assessing the career success and satisfaction of our graduates and thus we will make every effort to maintain contact with our graduates to this end. University advancement maintains contact lists but the program will attempt to maintain a strong post-graduation community. Graduates will be invited to participate in both informal and in-class settings. The efforts to improve the program, whether in content or delivery, in response to the data/feedback will be routine and on-going.
6. RESOURCES

6.1 UNDERGRADUATE PROGRAMS

The following outlines the resources that will be devoted to the program, from initial implementation and continuing on beyond full maturation. These resources are more than adequate to sustain the quality of scholarship produced by undergraduate students' scholarship and research activities.

i. Administrative, Physical and Financial Resources

Administrative Resources

The IBEHS+ program will be jointly administered by the Faculty of Health Sciences and Faculty of Engineering, each consisting of faculty with a strong commitment to undergraduate and graduate education. Direct support will be provided by seven (7) new staff positions who will be recruited specifically for this program; a Program Coordinator (1.0 FTE staff member), three Administrative Assistants (3.0 FTE staff member), an Academic Advisor, and two lab technicians (2.0 FTE). The Program Coordinator will oversee the administration of the program and will function as the primary administrative contact for admissions, calendar changes, degree audits, in addition to the coordination and support of teaching and mentoring by experts outside each faculty. The Administrative Assistants will provide front-line assistance to faculty, the Coordinator and the Co-Directors of the Program, will assist the Co-Directors with overseeing the program curriculum, and will be responsible to marketing the program. The Academic Advisor will provide front-line assistance to students at all levels of the program. The lab technicians will provide technical expertise and support for all Health Solutions Design Projects courses, as well as a degree of continuity from year-to-year that is critical to ensure achievement of the program learning outcomes. These administrative requirements are appropriate for the projected total enrolment of the program (700 students at maturation). The program will also support two Co-Directors (0.4 existing FTE; 0.2 FTE is assigned to the Faculty of Engineering and 0.2 FTE is assigned to the Faculty of Health Sciences) who will be appointed to oversee the program. Two co-directors ensures program leadership is appropriately apportioned between the two faculties whilst maintaining CEAB requirements that a Professional Engineer be involved with overseeing the program curriculum. Finally, faculty have been hired in anticipation of this program by the Faculty of Engineering (3 between 2011 and 2013, and 3 in the 2014-15 academic year), with additional hires anticipated in the coming years (4 tenure-track and 1 teaching-track), who will contribute to the program through teaching and mentorship (refer to the Program Implementation section below for additional details). Hiring of additional faculty will be in supported by revenue generated by the program, as outlined in the New Undergraduate Program Resource Implications and Financial Viability budgeting template that has been prepared alongside this proposal, and will be in step with phasing in the program from the start date to full maturation.

The School of Biomedical Engineering has a large graduate student contingent (42 students) available to participate as Teaching Assistants (TAs) within the program, many of whom (28 students) currently serve as TAs outside Biomedical Engineering. The IBEHS+ program will enlist additional TAs from this pool of graduate trainees as well as from the 7 Departments in the School of Engineering and Applied Sciences and from the Faculty of Health Sciences. An Instructional Assistant Intern (IAI) will be hired each year to provide support for the Level I Health Solutions Design Projects course. IAIs will be hired from a pool of undergraduate engineering co-op students who seek a work placement during their undergraduate studies Health Science
programs draw on a TA pool that has a wide range of expertise and represents all areas of the Faculty. Business School TAs will be used to support the entrepreneurship courses. Instructors are provided with TA applications and make the final decision with respect to expertise and knowledge background appropriate to the need.

**Physical Resources**

Office space for the new program, which includes space for administrative staff and the additional faculty, will be provided by the Faculty of Engineering (1,000 sq. ft.). Additionally, the Faculty of Engineering will also provide dedicated workspace for laboratory’s and design studios in order to offer an exciting and innovative student experience through experiential learning practices. This dedicated workspace will include an upgrade to the existing biomedical measurement and instrumentation laboratory (600 sq. ft.), a new medical imaging laboratory (400 sq. ft.), and a dedicated design studio for the Health Solutions Design Projects courses (1,000 sq. ft.). The Health Solutions Design Projects courses, in particular, will place a strong emphasis on experiential learning. Complementary support, in addition to the dedicated design studio space, will be provided to students through the Gerald Hatch Centre for Engineering Experiential Learning, a central hub for student-focused experiential learning initiatives across the Faculty of Engineering. The “Hatch Centre” will serve as a physical resource to our students, offering space for transformative learning experiences. The availability of all workspace outlined above has been confirmed by the Faculty of Engineering’s Administrative Coordinator (Appendix N).

Classrooms will be available for formal lectures and tutorials via the Registrar’s office. Classroom requirements include rooms with capacity for 50 students (up to 12 hours per week), 100 students (up to 6 hours per week), 150 students (up to 24 hours per week) and 300 students (2 hours per week). Small learning and teaching spaces (15-30 students) for the Health Solutions Design Projects courses as well as the Health and Engineering Entrepreneurship courses will be available through the Registrar’s office as well as 2 additional sources; rooms in the Michael DeGroote Centre for Learning and Discovery building and the Health Sciences building, available through the Faculty of Health Sciences, and rooms in the Engineering Technology Building, available through the Faculty of Engineering.

**Financial Resources**

Although both the Faculty of Engineering and Faculty of Health Sciences are very research intensive, with members holding numerous research grants to support their respective undergraduate and graduate programs, revenue generated by the program will be from a combination of BU and tuition funds, and will be sufficient to support all central expenses and program direct expenses. These program direct expenses, as outlined in the budget template prepared alongside this document, include remuneration for the Program Co-Directors and Administrators and support staff, hiring of new faculty to contribute to program offerings, TA and other teaching costs, and all capital equipment costs.

**ii. Library, Technology, and Laboratory Resources**

**Library Resources**

The two major libraries that will serve the needs of our students are the H.G. Thode Library of Science and Engineering and the Health Sciences Library. Each library houses an extensive collection of books and journals that are highly relevant to the students in our program. The Thode Library is located in close proximity to the John Hodgins Engineering building, which is home to the Faculty of Engineering, as well as the Engineering Technology Building, and houses
collections in all various disciplines of science and engineering. The Health Sciences Library is located directly in the Health Sciences Centre, which is home to the Faculty of Health Sciences, and is the University’s major medical/life sciences library. Together, the Thode Library and Health Sciences Library offer a diverse selection of collections and resources that are in keeping with the interdisciplinary nature of the program. Each library subscribes to an extensive collection of online journals, which are fully accessible from campus and off-site using the E-Resources website. All students have access to the library’s online collection using their MacID, a unique authenticator that grants access to all of the web resources of the University. Full details including the extent and scope of holdings relevant to the program is found in the Library Report for both the Thode Library and the Health Sciences Library (Appendix N).

Technology and Laboratory Resources

The IBEHS+ program will utilize several undergraduate teaching laboratories within the Faculty of Health Sciences and the Faculty of Engineering. Undergraduate teaching laboratories include an anatomy laboratory for the two (2) Anatomy and Physiology courses (HTHSCI 2L03 and HTHSCI 2LL3), a computer lab and design studio for the new Level I Health Solutions Design Projects course, a biomedical measurement and instrumentation lab for ELECENG 4BD4 and a medical imaging lab for the new Medical Imaging course.

The anatomy laboratory in the Institute for Applied Health Sciences building houses a maximum of 36 students and will serve as an important teaching resource for the two (2) Anatomy and Physiology courses taken in Level II. This teaching lab is equipped with up-to-date equipment and supplies designed to provide students and instructors with improved viewing of group demonstrations. The anatomy laboratory is supported by a laboratory technician, and access to the lab is restricted to students registered in courses that require use of the space via a pass card security system. The lab currently serves more than 1,000 students from three faculties, including students in Health Sciences and students in the existing 4-year Electrical and Biomedical Engineering and 5-year Chemical Engineering programs, which currently utilizes the lab two hours each week via two 2-hour biweekly lab sections. To meet the needs of the new IBEHS+ program, four additional lab sections, held biweekly, are required each term (3 additional hours per week). Revenue generated by the program will support additional costs incurred for use of the space, which includes the cost of additional teaching assistants and a proportional share of the lab technician and supplies.

The Level I Health Solutions Design Projects course requires a computer lab equipped with the appropriate software, including solid and system modelling packages and both high-level and low-level computer programming packages. These requirements are consistent with the requirements for engineering courses in the Level I program, and there are several computer labs across the University including labs in the John Hodgins Engineering building and Engineering Technology Building that can support 25-50 students at a time. As such, the only costs incurred will be for the use of the space, which includes the cost of additional teaching assistants and a proportional share of IT support, computer maintenance and software upgrades.

Additional technological and laboratory resources will be provided to students in the Level I Health Solutions Design Projects course in the form of a dedicated design studio. This dedicated workspace will serve as a central hub for students in each of the Health Solutions Design Projects courses. Students will use this workspace to collaborate, design solutions to biomedical problems and develop working prototypes. Necessary resources include dedicated workspace (1,000 sq. ft.), new furniture, instructional equipment and IT infrastructure, 3D printers, and computer workstations equipped with the appropriate software. The design studio will be under the
supervision of two (2) Laboratory Technician’s with assistance provided by an Instructional Assistant Intern. Additional costs incurred will go towards the cost of IT support, audio/visual services, computer maintenance, software upgrades, and general supplies.

The biomedical measurement and instrumentation laboratory in the Department of Electrical and Computer Engineering provides students with hands-on experience in measuring human physiological function. The existing lab currently serves the existing 4-year Electrical and Biomedical Engineering program and has a capacity for 20 students. Revenue generated by the program will support the purchase of updated equipment, including computers, the instrumentation station and computer lab interface, a biomedical circuit board and accessories (e.g., cabling, sensors, etc.). Renovations (as required) and the purchase of additional furniture and equipment will occur in either the second or third year of the program, as the space will not be required until the program’s fourth year. Additional costs incurred will go towards the cost of additional teaching assistants, IT support, computer maintenance and software upgrades.

A medical imaging laboratory will provide students with the opportunity to learn, from hands-on experience, how the mathematical and computational theory behind various medical imaging modalities translates to real medical images, and how this knowledge can be used to optimize the information extracted from these images. Necessary resources for this lab include additional laboratory space (400 sq. ft.) and associated renovations, new furniture, two (2) DeskCAT Optical CT scanners, two (2) Benchtop MRI Tomograph workstations, and computer workstations equipped with the appropriate software. The lab is required by the program’s fourth year, and thus acquisition and renovation of lab space can occur in either the second or third year of the program. Additional costs incurred will go towards the cost of additional teaching assistants, IT support, computer maintenance and software upgrades.

iii. Faculty

The Faculty of Engineering has a strong core of faculty members with expertise and demonstrated achievement in various fields across biomedical engineering, including senior faculty who are at the top of their fields as well as junior faculty who are emerging stars. Table 14 outlines the list of core faculty within the Faculty of Engineering that are qualified to teach in the IBEHS+ program. Included among this list are three (3) recent hires who will begin in 2016 (Didar, Hoissendout, Keshavarz-Motamed). Many of these faculty currently hold an appointment within the School of Biomedical Engineering and contribute to the program through teaching of biomedical engineering graduate courses and supervising graduate students at both the Masters and Doctoral level. The IBEHS+ program will capitalize on the Faculty’s excellence in research to provide quality mentorship and undergraduate supervision for the various Health Solutions Design Projects courses as well as the Biomedical Capstone course. The Faculty of Engineering is also committed to recruiting an additional five (5) faculty members (four tenure-track and one teaching-track) to support the program offerings through teaching, mentorship and undergraduate supervision. With this addition of new complement of faculty, the Faculty of Engineering will expand on its breadth of research strength that spans diverse aspects of biomedical engineering including bio-materials, biomedical devices, bio-fluidics, and micro/nano-bioengineering.

The Faculty of Health Sciences has a demonstrated track-record of excellence in teaching and mentorship through its well-established and highly successful Bachelor of Health Sciences (B.H.Sc.) program. This program is driven by a group of faculty who are internally supportive of each other and committed to the developmental arc of its learners. Table 14 outlines the list of faculty within the Bachelor of Health Sciences program that will teach the Health Sciences courses for the IBEHS+ program and contribute to mentoring the Health Solutions Design Projects.
courses. This group of faculty are ideally-suited for the new IBEHS+ program, as the program will draw on the problem-based and inquiry-based learning principles that have been so well established by the existing B.H.Sc. program and serve as a model for other programs. Health Science programs exists within a matrix system outside of departments. The education programs negotiate teaching with departments as required and compensate departments for faculty participation. TAs are similarly arranged by negotiation with the graduate programs office. There are more than 1,000 faculty members in the Faculty of Health Sciences who regularly contribute to teaching in health science health professional and non-health professional programs. The existing programs work with Department Chairs and Departmental Education Co-coordinators to fill teaching needs. New programs will follow the same procedures.

Proposed teaching assignments for courses in the IBEHS+ program are outlined in Appendix M (Table M-1 and Table M-2). Faculty will be assigned a total of no more than 1-2 teaching credits within the IBEHS+ program (either a course or faculty mentorship), allowing room in their available teaching load to teach courses in their home department (which would include the BME electives which are open to students outside the IBEHS+ program as a technical elective) as well as fill in for any expected or unexpected absentees (e.g., teaching relief, paternity leave, medical leave, sabbaticals, etc.). The tables offer only proposed assignments that are subject to change, and are meant to highlight the appropriateness of the faculty size for the program. It can be clearly seen from Table M-1 and Table M-2 in Appendix M that the faculty outlined in Table 14 are more than sufficient to meet the teaching demands of the program, even before our commitment to hire new faculty members in the coming years, as outlined above.

Table 14. Faculty members who will be involved in the delivery of the IBEHS+ program

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>M/F</th>
<th>Home Unit</th>
<th>Status</th>
<th>Teaching UG/G</th>
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<tbody>
<tr>
<td>C. Anand</td>
<td>M</td>
<td>Computing &amp; Software</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>I. Bruce</td>
<td>M</td>
<td>Electrical &amp; Computer Engineering</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>H. deBruin</td>
<td>M</td>
<td>Electrical &amp; Computer Engineering</td>
<td>Professor</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>*T. Didar</td>
<td>M</td>
<td>Mechanical Engineering</td>
<td>Assistant</td>
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<tr>
<td>T. Doyle</td>
<td>M</td>
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<td>Associate</td>
<td>UG</td>
</tr>
<tr>
<td>W. El-Dakhakhni</td>
<td>M</td>
<td>Civil Engineering</td>
<td>Associate</td>
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</tr>
<tr>
<td>Q Fang</td>
<td>M</td>
<td>Engineering Physics</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>R Ghosh</td>
<td>M</td>
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<td>Professor</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>K. Grandfield</td>
<td>F</td>
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<td>Assistant</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>T. Hoare</td>
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<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>*Z. Hoissendout</td>
<td>F</td>
<td>Chemical Engineering</td>
<td>Assistant</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>A. Jeremic</td>
<td>M</td>
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<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>K. Jones</td>
<td>F</td>
<td>Chemical Engineering</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>*Z. Keshavarz-Motamed</td>
<td>F</td>
<td>Mechanical Engineering</td>
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</tr>
<tr>
<td>M. Noseworthy</td>
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<tr>
<td>C. Quenneville</td>
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</tr>
<tr>
<td>O. Rubel</td>
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<tr>
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<td>H. Sheardown</td>
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<tr>
<td>S. Sirouspour</td>
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<td>L. Soleymani</td>
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<td>Assistant</td>
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<tr>
<td>G. Wohl</td>
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<td>UG &amp; G</td>
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<tr>
<td>I. Zhitomirsky</td>
<td>M</td>
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<td>Professor</td>
<td>UG &amp; G</td>
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**Health Sciences**

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<th>Department</th>
<th>Title</th>
<th>UG/G</th>
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<tbody>
<tr>
<td>A. Ball</td>
<td>M</td>
<td>Pathology and Molecular Medicine</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>J. Beyene</td>
<td>M</td>
<td>Clinical Epidemiology &amp; Biostatistics</td>
<td>Professor</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>R. Bishop</td>
<td>M</td>
<td>Biochemistry &amp; Biomedical Sciences</td>
<td>Associate</td>
<td></td>
</tr>
<tr>
<td>D. Bryant</td>
<td>F</td>
<td>Clinical Epidemiology &amp; Biostatistics</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>D. Harnish</td>
<td>M</td>
<td>Pathology and Molecular Medicine</td>
<td>Professor</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>T. Hawke</td>
<td>M</td>
<td>Pathology and Molecular Medicine</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>Y. Li</td>
<td>M</td>
<td>Biochemistry &amp; Biomedical Sciences</td>
<td>Professor</td>
<td>UG &amp; G</td>
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<tr>
<td>M. MacDonald</td>
<td>F</td>
<td>Biochemistry &amp; Biomedical Sciences</td>
<td>Associate</td>
<td>UG</td>
</tr>
<tr>
<td>P. Rangachari</td>
<td>M</td>
<td>Faculty of Health Sciences</td>
<td>Professor</td>
<td>UG</td>
</tr>
<tr>
<td>C. Richards</td>
<td>M</td>
<td>Pathology and Molecular Medicine</td>
<td>Professor</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>M. Secord</td>
<td>F</td>
<td>Psychiatry &amp; Behavioural Neurosciences</td>
<td>Assistant</td>
<td>UG &amp; G</td>
</tr>
<tr>
<td>G. Singh</td>
<td>M</td>
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<td>Professor</td>
<td>UG &amp; G</td>
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<tr>
<td>E. Szabo</td>
<td>F</td>
<td>Biochemistry &amp; Biomedical Sciences</td>
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<tr>
<td>B. Trigatti</td>
<td>M</td>
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<tr>
<td>G. Werstuck</td>
<td>M</td>
<td>Biochemistry &amp; Biomedical Sciences</td>
<td>Associate</td>
<td>UG &amp; G</td>
</tr>
</tbody>
</table>

*aThis is the budget unit paying the salary: department, school, research centre or institute, or other.*

*bUG/G, Undergraduate/Graduate*

*indicates a recent hire scheduled to begin in 2016*

iv. **Anticipated Class Size**

We plan to admit 140 students to Level I of the IBEHS+ program each year. The existing Bachelor of Health Sciences program and Electrical and Biomedical Engineering program currently have high rates of retention, and we anticipate a similarly high rate of retention in the IBEHS+ program. We expect 130 students to progress to Level II of the program, opening up 10 spaces for students who have successfully completed the common Engineering I program to transfer into the IBEHS+ program at Level II, provided they meet the Admission Requirements outlined in Section 2.1 (these numbers are expected to vary from year-to-year). Allowing for some additional attrition between Levels II and V, we expect an enrolment of approximately 670 students across the 5-years of the program by its maturation.

v. **Program Implementation**

Both the Faculty of Engineering and Faculty of Health Sciences will contribute considerable resources towards phasing in the IBEHS+ program and meeting the targeted September 2017 start date. Initial enrolment will be equivalent to the projected annual enrolment of 140 students per year. This is appropriate given the existing high demand for both the Faculty of Health Sciences’ Honours Bachelor of Health Sciences program and the Faculty of Engineering’s existing 4-year Electrical and Biomedical Engineering program. The Co-Directors of the Program will be appointed one year ahead of the targeted start date in order to facilitate with phasing in the program. This includes, but is not limited to, promotion and student recruitment, recruiting faculty (see below), transitioning available resources from the existing 4-year Electrical and Biomedical Engineering (ECE&BME) program to the new IBEHS+ program, and overseeing development of the core curriculum. The fact there is precedence set already through the existing 4-year ECE &
BME program, in terms of sharing with Health Sciences for teaching relevant courses, will make expansion to other Faculty of Engineering departments straightforward. Much of the first year is consistent with the Engineering 1 program, with only one new course to be offered (Health Solutions Design Projects 1). In similar fashion, the following year only offers one new course as well (Health Solutions Design Projects 1), with the balance of the IBEHS+ core courses already offered to students in the existing 4-year Electrical and Biomedical Engineering program (MATH 2Z03, MATH 2ZZ3, HTHSCI 2L03, HTHSCI 2LL3). This heavy emphasis on existing courses in math, science and health early in the program provides the necessary foundation of knowledge required to prepare students for educational offerings in biomedical engineering, with the majority of these courses being offered in Years 3 through 5 of the program.

The Faculty of Engineering has recently undertaken a significant hiring initiative across all 7 Departments to enhance the quality of research and teaching offerings across all existing and anticipated programs. Three (3) faculty members with a background in Biomedical Engineering have been recruited since 2011 (Grandfield, Quenneville, Soleymani), and an additional three (3) have recently been hired to begin in 2016 (Didar, Hoissendout, Keshavarz-Motamed). To support the new IBEHS+ program, the Faculty of Engineering is also committed to recruiting an additional five (5) candidates (four tenure-track and one teaching-track) with a Biomedical Engineering background. In total, this represents eleven (11) recent or forthcoming additions to the faculty with a background in Biomedical Engineering who will be qualified to teach and mentor in the program. The Faculty has also recently hired seven (7) new faculty in other areas across the 7 departments, with a commitment to hire an additional seven (7). These new recruits, although not intended to be involved with the delivery of the program, will allow existing faculty with a Biomedical Engineering background who are otherwise not presently teaching in this area to contribute to the program. Hiring of these new faculty will be in step with phasing in of the program, and will be supported by revenue generated by the program. Faculty will contribute to developing and teaching the core IBEHS+ engineering courses, and participating in student mentorship through the Health Solutions Design Projects courses as well as the Biomedical Capstone project. Faculty members will be chosen to mentor a particular project based on their experience and expertise in their respective fields. The faculty who will contribute to this program are diverse in not only their areas of expertise but also experience, providing students with a multitude of intellectual knowledge to draw upon. Faculty mentors will be assigned and agreed upon at the beginning of each academic year, with faculty receiving teaching credit for mentorship to ensure they are not overworked and can appropriately dedicate their time to meet the needs of the students.

In addition to new faculty, six (6) new staff positions will be created to administer and support the program (as discussed in section on Administrative, Physical and Financial Resources). The new positions are as follows: one full-time Program Coordinator, two full-time Administrative Assistants, one Academic Advisor, and two Laboratory Technician. The Program Coordinator and Administrative Assistants will be hired one year ahead of the targeted start date, in step with the appointment of the Program Co-Directors, in order to facilitate phasing in the program.

Additional space for the program will be provided by Faculty of Engineering, as outlined above in the section on Administrative, Physical and Financial Resources. This includes office space for administrative staff and additional faculty, and dedicated workspace for laboratory’s and design studios. In keeping with the University’s plan to secure adequate resources to invest in faculty, staff, student services and support, library resources, and space the Faculty is committed to using those resources strategically.
7. QUALITY AND OTHER INDICATORS

7.1 ACADEMIC QUALITY OF THE PROGRAM

Evidence of Quality of the Faculty

Faculty members are assessed based on their research performance through the quality of publications, research funding, supervision of graduate and undergraduate students, teaching evaluations and administrative service to the university or community.

Funding, Publications and Graduate Supervision

Faculty from both Engineering and Health Sciences who will be involved in delivery of the IBEHS+ program are highly successful, well-funded and recognized in their respective fields. In 2014-15, grants awarded to these faculty members (Table 14) averaged close to $300,000 per investigator. Total journal publications range from 12-165, with an average of ~60 per instructor (~35 first or corresponding author). Total invited presentations at meetings and conferences range from 5-123, with an average of ~20 per instructor. Total peer-reviewed abstracts at national and international conferences ranged from 34-196 with an average of ~80 per instructor. The wide ranges in journal publications, published abstracts and graduate students reflects the diverse experience of faculty members within the program.

Faculty within the program who are either tenured or tenure-track are highly involved in student supervision at all levels, including undergraduate, Master’s, Doctoral and Post-Doctoral. Graduate students work in state-of-the-art laboratory facilities that have the necessary equipment to conduct cutting-edge and innovative research, which is supported through the various research awards summarized above. Faculty members currently supervise an average of 2 Master’s students (range of 1-6), 3 Doctoral students (range of 1-10) and 1 post-doctoral fellow (range of 0-5). Overall, an average of approximately 14 Master’s students (range of 1-34) and 5 Doctoral students (range of 0-15) per faculty member have successfully graduated from their respective program.

Faculty Awards and Honours

Eight faculty members who will be involved in delivery of the IBEHS+ program are current or past holders (last 5 years) of Canada Research Chairs (Tier 1: Sheardown; Tier 2: Fang, Ghosh, Hoare, Li, Selvaganapathy, Soleymani, Szabo). Together, these CRC holders supervise an average of 8 graduate students. These numbers reflect a strong commitment to the health and vitality of the training environment. Several prestigious personal honours have been bestowed on our faculty over the past several years that recognize their success in both research and teaching. Awards pertaining to excellence in research include 3 Ontario Ministry of Research and Innovation Early Researcher Awards (Fang, Hoare, Selvaganapathy), a Canadian Biomaterials Society Early Career Investigator Award (Hoare), the Maureen Andrew New Investigator Award (Werstuck), Heart and Stroke Foundation of Canada New Investigator Award (Werstuck), Grand Challenges Canada Rising Star in Global Health (Selvaganapathy, Soleymani), Fellow of the Canadian Academy of Engineers (Sheardown), Douglas R. Colton Medal for Research Excellence (Soleymani), the Canadian Society of Chemistry W.A. McBryde Medal (Li), the John D. Cameron Endowed Chair in the Genetic Determinants of Chronic Diseases (Beyene), and the Ontario Cancer Treatment and Research Foundations Career Scientist Award (Singh). Awards pertaining to excellence in teaching and graduate supervision include the 3M National Teaching Fellowship (Harshi,
Rangachari), the American Physiological Society Claude Bernard Distinguished Lecturer (Rangachari), McMaster President’s Award for Excellence in Teaching (Rangachari), the Ontario Confederation of University Faculty Associations Teaching Award (Rangachari), McMaster President’s Award for Graduate Student Teaching (Noseworthy), McMaster President’s Award for Graduate Student Supervision (Sirouspour), and the McMaster Students Union Excellence in Teaching Award (Rangachari, Singh, Wohl).

**Indicators Used to Document and Demonstrate Academic Quality**

The McMaster Graduate Attributes Assessment Process (described in Section 5.3) will serve as the primary indicator to document and demonstrate the quality of the program. This process provides an avenue to measure and document student achievement in meeting Program Learning Outcomes and additionally provides key strategies for continually improving courses, and the program as a whole. Indicators built around the numerous group projects offered throughout the program will also be used, and include scholarly measures, student productivity, community engagement, and formative assessment and feedback. Additional indicators to document and demonstrate academic quality will include use of formative assessment and feedback, the number of awards and scholarships students receive, and retention rates at each level of the program.

**Primary Indicator: McMaster Graduate Attribute Assessment Process**

Academic quality of the program will be documented and demonstrated using the McMaster Graduate Attributes Assessment Process. This process was developed by the Faculty of Engineering over a six-year period in order to meet the requirements of CEAB accreditation, and is currently in place to document and assess academic quality across all engineering programs. This process is based on: 1) mapping Graduate Attribute indicators to the entire course curriculum, 2) measuring student performance in each course (through assignments, midterms, projects, exams, etc.) as they pertain to a particular indicator, taking care to ensure all indicators are sufficiently measured, 3) completing a graduate attributes measurement report documenting the results of these measurements, and 4) recommending improvements to the course based on these results. This assessment process is described in greater detail in Section 5.3.

**Group Project Work**

The Health Solutions Design Projects courses will provide several additional means for documenting and demonstrating academic quality, in addition to the aforementioned graduate attribute measurement reports. All projects will culminate with a final submission, and will include some combination of a written report and/or thesis, an oral presentation, and a working prototype. Any written submissions will include a summarized document, the exact details of which expected to vary from project-to-project (e.g., executive summary, abstract, brochure, advertisement, design specifications, etc.). Student productivity will be documented by collectively assembling these submissions as a single document for publication in the University’s online Library catalogue. At least one of the projects will provide an opportunity for students to be involved with community engagement, with students working with a client in the community to develop a real solution to address either a long-term or short-term need. Solutions developed by students that are deemed to be of exceptional quality will be invited to participate in a scholarly presentation that is assessed by an independent judging panel, including the client(s) and experts in related fields. Upon project completion, formative feedback will be sought by the students, the client, and an independent group of experts in related fields to assess the overall quality of the work produced by the students collectively. This model of documenting and demonstrating
academic quality of student work has been met with considerable success in other engineering courses, particularly the first year course on engineering profession and practice.

Students in their final year of the BME specialization will complete a 6-unit undergraduate Biomedical Capstone Design Project course. Working directly under the supervision of a faculty member, students will research and design a solution to a biomedical problem. The project will culminate in a showcase event, wherein student groups are invited to present their work in a judged event. Students will present their work in the form of poster presentations and, if applicable, a working demonstration of their designs. This event will be open to the University and surrounding community. All project documents, including written reports and prototypes will be collected, and may be used towards faculty research, future projects, and undergraduate recruitment events.

The final year of the HEE specialization requires an assessment of student learning over a 4-year period. This will inform both quality and curriculum decisions.

Additional Indicators

Retention rates will be continually monitored, especially during program implementation, and steps will be taken, as necessary to ensure that retention accurately reflects not only the quality of the students but the program as whole. Our expectation is that this program will attract exceptionally qualified students and serve as a model for high-level educational programming. To that end, we expect retention rates across the program to exceed other programs offered in the Faculty of Engineering as well as the Bachelor of Health Sciences Program. Given our expectations for the quality of students in the program, incoming scholarships and awards data, as well as those awarded while students are enrolled in the program, will be continually documented. Additionally, these students will be recognized for their efforts and achievements in the form of publications, press releases and award recognition ceremonies.

Following completion of projects and project-based courses, faculty within the program will hold round-table discussions with students. Discussions will be held with students in each course, but also with students across the entire program. The objective here is to gain formative feedback on the strengths of the various projects and courses, as well as the program as a whole, but also areas in which improvements can be made. This feedback will be documented and used towards continually improving the program. It will also serve as an important indicator for IQAP reviews.

7.2 INTELLECTUAL QUALITY OF THE STUDENT EXPERIENCE

Faculty Enhancement and Renewal

The Faculty of Engineering has had several years' experience delivering the Electrical and Biomedical Engineering program. All the faculty associated with that program will contribute to the delivery of the new IBEHS+ program. In addition, faculty from Health Sciences will provide the necessary expertise in medical and health sciences that is commensurate with the focus of the program (Table 14). To further enhance the quality of our research offerings, the Faculty of Engineering has hired, over several years, a number of highly qualified faculty across all departments who have a strong background in Biomedical Engineering. These new recruits have brought with them expertise and experience in sub-disciplines of biomedical engineering that build on the scope of the existing Electrical and Biomedical Engineering program, and will serve to strengthen the breadth of research and scholarly activity of the incoming IBEHS+ program. These sub-disciplines include biomechanics (Quenneville), biomaterials (Grandfield), biomedical
devices (Didar, Soleymani), biocolloids (Hoissendout), and bio-fluidics (Keshavarz-Motamed). In addition, the Faculty of Engineering will be recruiting additional faculty members in areas of biostatistics, instrumentation, biomedical devices and biomaterials; with the intent of adding new research and scholarly capacity to the program.

Promoting Student-Faculty Interactions

The IBEHS+ program will foster strong bonds between students and faculty through its project-based courses that will offer regular faculty-student interactions. Consistent with the interdisciplinary nature of the program, students will be faced with biomedical problems that cover a wide spectrum of topics in the areas of engineering and health. To solve these problems, students will need input and guidance from experts across these areas. Faculty members within the program will meet these needs by serving as mentors to the students. Each project will be heavily resourced with mentorship by both faculties in order to provide low student-mentor ratios and improve the overall student experience. Faculty members will be chosen to mentor a particular project based on their experience and expertise in their respective fields. The faculty who will contribute to this program are diverse in not only their areas of expertise but also experience, providing students with a multitude of intellectual knowledge to draw upon. Faculty mentors will be assigned and agreed upon at the beginning of each academic year, with faculty receiving teaching credit for mentorship to ensure they are not overworked and can appropriately dedicate their time to meet the needs of the students.

Relevant Experience and Expertise of Faculty

Faculty members within the program are heavily engaged in undergraduate training and supervision within their home faculty, and bring with them considerable experience in guidance and mentorship. Through research projects and senior theses, faculty in Health Sciences are actively involved with undergraduate student supervision, and have a strong appetite to mentor young scientists. Members in Faculty of Engineering mentor students at varying levels throughout their studies. Of note is the senior Capstone Design Project, a requirement across all departments in the Faculty. All faculty members serve as a mentor to one or more groups of undergraduate students, either offering up a project that is tailored to their research, or accepting a student proposal that would contribute to progressing their research forward. Each year, there are a sufficient number of research and design projects to accommodate every student across the various programs, which is a testament to the desire of the faculty to integrate their research with undergraduate educational offerings. The experiences these faculty bring with them are well aligned with the mentorship that will be offered in the Health Solutions Design Projects courses, the Biomedical Capstone course (for the BME specialization) and the Health, Engineering and Entrepreneurship courses (for the HEE specialization).

Solving biomedical problems requires collaborations between experts across a wide spectrum of fields in engineering and health. Research and design projects throughout the program will be intentionally designed around real-world problems of an interdisciplinary nature. As such, students will require guidance from faculty who collectively have a diverse background across many areas of biomedical engineering and health. Faculty members contributing to the IBEHS+ program have been identified and selected such that their collective backgrounds and experience are sufficiently far-reaching to meet this requirement. As outlined above, the faculty contributing to the program have both the necessary knowledge and expertise as well as the experience and desire to contribute towards undergraduate guidance and mentorship. To ensure the best possible student experience, potential faculty mentors will be identified early, and their expertise regularly
sought in the development of new, and modification of existing, design projects. Through this approach, project topics will be especially relevant to the experience and expertise of the mentoring faculty. By being closely involved in the project development process, the faculty mentors will be able to better relate their experience and expertise to the biomedical problem the students are faced with. To ensure faculty are not overworked and can appropriately dedicate their time to meet the needs of the students, the program is committed to offering teaching credit for mentorship, rather than an expectation of their involvement within the IBEHS+ program.

Facilities and Services

The educational and research infrastructure within each faculty will allow for student access and exposure to high-end, state-of-the-art research facilities that will successfully merge our research and teaching activities. These are outlined in greater detail in Section 6.1ii, and include the anatomy lab, a biomedical measurement and instrumentation lab, a medical imaging lab and a dedicated design and innovation studio.
REPORT TO THE SENATE
FROM THE
UNIVERSITY PLANNING COMMITTEE

(i) Proposal to Establish the Centre for Advanced Research in Experimental and Applied Linguistics (ARIÉAL)

At its meeting of January 20, 2016, the University Planning Committee approved a proposal to establish the Centre for Advanced Research in Experimental and Applied Linguistics (ARIÉAL). The proposed Centre is built on the understanding that language, cognition and brain function as a single, complex and integrated system that allows for human comprehension and communication. The Centre will enable investigation of this fundamental system by fostering collaboration across theoretical and applied disciplines, bringing together researchers versed in experimental and applied methods, and behavioural and neurophysiological approaches to linguistics, language cognition, and cognitive neuroscience. The Centre will be uniquely positioned to investigate all elements of language structure and function, and changes in language ability due to developmental and life events. This collaborative approach to the study of language learning, language loss, and language recovery will allow ARIÉAL members to make significant contributions to the Centre’s core areas of research and will enhance the public profile of McMaster as a hub for innovative, interdisciplinary research.

The University Planning Committee now recommends,

that Senate approve, for recommendation to the Board of Governors, the establishment of the Centre for Advanced Research in Experimental and Applied Linguistics (ARIÉAL), as set out in the attached.

For Information

(ii) Proposal to Establish of a Ph.D. Program in Communication, New Media and Cultural Studies

At the same meeting, the University Planning Committee approved a proposal for the establishment of a Ph.D. Program in Communication, New Media and Cultural Studies, effective September 2017. The proposed program brings together three interdisciplinary fields of cultural studies, communication studies, and new media, to examine the problems faced today, such as social and environmental injustice, climate change, precarious work, surveillance, and a shrinking public sphere, in the context of communications and culture.

(iii) Proposal to Establish an Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) Program

At the same meeting, the University Planning Committee approved a proposal to establish an Integrated Biomedical Engineering and Health Sciences Plus (IBEHS+) program, effective September 2017. The IBEHS+ is an innovative collaborative program proposed by the Faculties of Engineering and Health Sciences and leads to one of two five-year degree pathways with a common core: an Honours Bachelor of Health Sciences in Health, Engineering and Entrepreneurship (HEE specialization) or a Bachelor of Engineering in Engineering and Biomedical Engineering (BME specialization). Both degree programs include a Co-op option.

Senate: February 10, 2016
Proposal for the establishment of AReAL
Centre for Advanced Research in Experimental & Applied Linguistics

The Centre for Advanced Research in Experimental and Applied Linguistics (AReAL) understands language, cognition and brain function as a single, complex and integrated system that allows for human comprehension and communication. We will investigate this fundamental system by fostering collaboration across theoretical and applied disciplines, bringing together researchers versed in experimental and applied methods, and behavioural and neurophysiological approaches to linguistics, language cognition, and cognitive neuroscience. The Centre will be uniquely positioned to investigate all elements of language structure and function, and changes in language ability due to developmental and life events. This collaborative approach to the study of language learning, language loss, and language recovery, will allow AReAL members to make significant contributions to the Centre’s core areas of research, and enhance the public profile of McMaster as a hub for innovative, interdisciplinary research. We believe that our engagement with a deep and comprehensive view of linguistic research will in turn allow us to engage with a broader community at McMaster, regionally, and internationally.

Department of Linguistics & Languages and Faculty of Humanities, May 2015
Proposal for the Establishment of a New Research Centre
The Centre for Advanced Research in Experimental and Applied Linguistics (ARiEAL)
November 2015

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1. Official Name:
The Centre for Advanced Research in Experimental and Applied Linguistics (ARiEAL)

2. Objectives:

The Centre for Advanced Research in Experimental and Applied Linguistics (ARiEAL) understands language, cognition and brain function, not as separate phenomena, but as a single, complex and integrated system that allows for human comprehension and communication. Our goal is to investigate this fundamental system by fostering collaboration across theoretical and applied disciplines, bringing together researchers versed in experimental and applied methods, and behavioural and neurophysiological approaches to linguistics, language cognition, and cognitive neuroscience. The Centre will be uniquely positioned to investigate all elements of language structure and function, and changes in language due to developmental and life events.

This collaborative approach to the study of language learning, language loss, and language recovery, will allow ARiEAL members to make significant contributions to the Centre's core areas of research, and enhance the public profile of McMaster as a hub for innovative, interdisciplinary research. We believe that our engagement with a deep and comprehensive view of linguistic research will in turn allow us to engage with a broader community at McMaster, regionally, and internationally.

The Centre has four key objectives:

1) To build upon a history of research excellence and create a unique environment that will enable innovative, collaborative research in experimental, clinical, and applied linguistics, and the effective knowledge organization and transfer of this research to relevant academic, community and industry groups.

2) To provide opportunities for interdisciplinary, experiential, and problem-based student learning and mentorship at the undergraduate, graduate, and postdoctoral levels, and to contribute to best practices in teaching and learning at McMaster.

3) To promote a meaningful international perspective on experimental, clinical and applied linguistics, and establish mutually beneficial research collaborations with international academic institutions in order to build research expertise and capacity both at McMaster and at affiliated institutions.

4) To expand the existing engagement with the broader community — including clinicians, educators, healthcare specialists, and the general public — on core research related to matters of literacy and literacy-related obstacles, first and second language learning and loss, acquired brain injury, and neurodevelopmental disorders.
3. Rationale:

The Centre will bring together a diverse yet cohesive collection of researchers to break new ground in our understanding of the neural, behavioural, and social foundations of human communication in health and pathology. Recent emphasis in basic and clinical science on language recovery mechanisms, as well as the commercial environment in Europe and the U.S., indicate an increased need for research on language learning, loss, and recovery. ARIEAL’s team of researchers, working together with clinicians and educators from the larger community, is uniquely positioned to engage in this research because of its internationally recognized experience in language dysfunction in brain injury, extensive experience in brain recording/imaging/signal analysis, and relevant cognitive and linguistics research (e.g., bilingualism). This work offers significant social benefits in health and education, including areas of adult literacy, second language acquisition, language attrition, and brain injury from coma to concussion, as well as commercialization opportunities in healthcare devices, software, and learning/rehabilitation services.

The Centre will initiate collaborations with key international institutions in five countries that represent emerging or developing economies (Brazil, Cuba, Ghana, Jamaica, Nigeria). All but Cuba currently lack the infrastructure and expertise to conduct needed research into a range of cognitive impairments affecting language acquisition or retention, and all five nations are typically underserved by the focus on English language based research in the cognitive science of language.1 Currently, the Centre has contacts with researchers at the University of the West Indies in Jamaica (Mona), Olabisi Onabanjo University in Nigeria (Ogun State), the Cuban Neuroscience Center, and the University of Ghana; the team is also seeking to work with an institution in Brazil. Development of these research collaborations will allow for the building of expertise in the target countries, and enable McMaster to forge unique collaborations that will expand the field of cognitive science/neuroscience of language research.

ARIEAL, through its partnership with the McMaster English Language Development Diploma Program (MELD), will provide valuable service to the McMaster community by increasing ESL/EAP (English for Academic Purposes) teaching and learning expertise and capacity throughout the University. The ARIEAL/MELD partnership will make possible unique research opportunities in the study of second language acquisition by facilitating fine-grained longitudinal research on language learning regarding the development of acoustic, phonological, and semantic skills in both comprehension and production. An innovative research element will include development of sophisticated neurocognitive outcome measures of second language learning; such methodologies are currently very rare in disciplines related to second language learning. This opportunity integrates perfectly into existing language learning programs in the Department of Linguistics and Languages. Based on this research, ARIEAL will be able to develop and implement improved best practices in ESL/EAP training generally, and also in regard to specific first languages and language groups. This research will be transferred to the McMaster community by providing teaching and learning support, and training and resources for graduate TAs as well as for graduate students who are second language speakers of English. While many Canadian universities offer English language bridging programs, we believe that our unique, integrated approach, with an embedded mentorship component and informed by research, provides greater value to

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1 Although Ghana, Jamaica and Nigeria are de jure or de facto English-dominant, citizens also (or only) speak either dominant or non-dominant indigenous languages (of which there are hundreds in Ghana and Nigeria), or non-standard varieties of English (Jamaican creole/patois, West African Pidgin English), that have not received attention (virtually at all) from a language pathology perspective.
students whose first language is not English, the larger university community, and to ESL/EAP teaching and learning as a field.

The Centre will enhance the research profiles of its members and the identity of McMaster as a space for research and evidence-based teaching excellence. ARIEAL members have a demonstrated track record of accomplishment, with Full Members spanning the senior, mid- and early-career levels. Centre members have secured funding from sources including CFI, CIHR, NSERC, SSHRC, Ontario Centres of Excellence, Ontario Brain Institute, NIH, and Autism Speaks, as well as significant teaching recognition, including university and provincial awards for undergraduate teaching and academic mentorship. By consolidating and building upon established strengths, with an increased focus on internationalization and interdisciplinarity, the Centre will contribute to McMaster’s strategic objectives and strengthen the University’s local, national and global reputation.

4. Proposed Activities and Research:

4.1 Proposed Activities:

In order to fulfill these objectives the Centre will engage in the following proposed activities:

- **Bi-monthly Member Meetings.** Centre members will share progress updates on current research projects; discuss research challenges, methodologies and insights; share funding and partnership development opportunities; and cultivate new collaborative research and knowledge mobilization projects. Meetings will be facilitated by Members of ARIEAL on a rotating basis.

- **Fellowship Program for Doctoral Students.** The Centre will provide one-year research fellowships for two doctoral students who wish to engage in intensive research in applied or experimental linguistics under the primary supervision of a Full Member of the Centre. The doctoral fellowships will contribute to knowledge mobilization and transfer conducted by the Centre. Two ARIEAL doctoral fellowships were already awarded in 2014-15.

- **International Students’ Fellowships and Awards.** The Centre will provide 6-12 month fellowships to support mentorship and training for visiting graduate students from the international institutions affiliated with the Centre. ARIEAL will also work with promising international undergraduate students, their academic supervisors, and home institutions, to develop applications for Mitacs Globalink Research Awards, which will fund students to visit McMaster and work with a Centre member on 12 to 24 week research projects. As soon as financially viable, the Centre will set aside funds to support international students who wish to complete graduate degrees at McMaster.

- **International Partnership and Exchange.** The Centre will seek to develop robust partnerships with academic institutions in Ghana, Nigeria, Brazil, and Jamaica. In addition, the Centre will incorporate existing collaborations with world-class institutions in the U.S., Cuba, Finland, the Czech Republic, Germany, and Spain. Existing collaborations include Connolly’s work with C. Mate-Kole at the University of Ghana and with P. Valdes-Sosa and V. Rodriguez at the Cuban Neurosciences Center and R. Ilmoniemi, Aalto University, Finland; Kuperman’s collaborations with J. Van Dyke at the Haskins Laboratories in the U.S; Kučerová’s collaboration with M. Docekal from Masaryk University;
and, Service’s collaborations with M. Laasonen, University of Helsinki. Exchange of expertise, including research visits, will be sponsored by application to funding sources such as the International Brain Research Organization (IBRO), which has sponsored Cuban visitors to Canada, and NSERC CREATE grants that support student training. Grant applications will also be prepared in conjunction with Memoranda of Understanding with U.S. collaborators, such as ARIEAL researchers’ existing MOU with the Haskins Laboratories in Connecticut.

- **Speaker Series and International Conference.** In order to disseminate research knowledge among both specialist and general audiences, and increase the visibility of the Centre and Humanities research at McMaster, ARIEAL will partner with the Linguistics & Languages department to support and expand the ‘Language Matters’ public speaking series, which is aimed at the broader regional community. In addition, together with the Department, ARIEAL will expand the Cognitive Science of Language Speaker Series that has brought internationally recognized researchers to McMaster to facilitate research exchanges and to provide our students with the best possible educational opportunities. A biennial international conference will be hosted by the Centre, with each conference addressing a theme relevant to ARIEAL’s core research activities.

- **Graduate TA and ESL Student Support.** The Centre will transfer research knowledge gained through its partnership with MELD to build the quality and capacity of ESL/EAP teaching and learning at McMaster. Training and resources will be made available online and offered during relevant events (e.g., TA Day) to provide both graduate TAs and graduate students whose first language is not English with updated best practices informed by new research.

- **Community Stakeholders’ Meetings.** Centre members will meet as needed with representatives of key partner community and regional organizations and institutions to discuss research outcomes and knowledge mobilization and transfer strategies (e.g., Connolly with the Hamilton Health Sciences group and the David Braley Athletic Centre, regarding concussion/brain injury studies; Kuperman and Service with the Hamilton-Wentworth Catholic District School Board and Mohawk College, regarding adolescent and adult literacy; Moro with the community of Hamilton Speech and Language Pathologists (Hamilton Health Sciences, St. Joseph’s Healthcare, Lear Communication, Hamilton-Wentworth district school boards) regarding clinical placements and clinician research partnerships.

- **Youth Outreach.** Centre members will build upon their existing youth outreach activities, in order to engage young people in the culture of research and knowledge translation through exposure to academic education and research. Annual spring/summer ‘open door’ days will be hosted by the Centre for secondary school students in the Greater Hamilton area. Annual information sessions for young adults enrolled in reading remediation programs are planned to assist them in overcoming academic challenges, and enable valuable feedback on existing remediation programs. Centre members will extend the reach of the ‘Language Matters’ lecture series by offering quarterly talks aimed at the general public through City of Hamilton venues (e.g., the Hamilton Public Library).

- **External Funding Development.** Centre members will continue to fund research activities and seek to increase funding opportunities for students and postdoctoral fellows through applications for peer-reviewed operating grants including NSERC, CIHR, SSHRC, CFI, and NIH.

Proposal for the establishment of ARIEAL


- **Scholarly Publication.** All team members will continue to add to proven track records of publication in top peer-reviewed journals in their fields and of presenting annually at important international academic and professional conferences.

- **Commercialization and Industry Engagement.** The Centre will expand upon current partnerships with industry (Konona Health Tech, Synaptive Medical, Translucent Inc.) and collaboration with facilitators (including MILO, MaRS, OBI, and Mitacs), while pursuing new commercialization opportunities, based on the development of existing and new IP realized through Centre research.

- **Centre Website and Resource Hub.** The website will provide researcher profiles for Full, Affiliate, and Student ARIEAL members; showcase the collaborative research conducted by members of the Centre; and promote upcoming workshops, conferences, and other events. The website will also serve as a hub for materials useful for the broader McMaster community related to the Centre’s research activities, including materials relevant to ESL/EAP teaching and learning.

**4.2 Core Research Areas:**

The Centre will bring together a diverse yet cohesive collection of researchers with expertise in linguistics and languages, relevant clinical conditions, and key neurophysiological, neuroimaging, and behavioural measures in order to advance understanding of the neural, behavioural and social foundations of human communication. Our approach relies on integrated experimental and applied research that crosses disciplinary boundaries, but encompasses the following areas of inquiry:

- **Mechanisms of normal and atypical reading behaviour informing practices and methods of adult literacy assessment and education.**
- **Word recognition and speech comprehension across languages.**
- **Language learning mechanisms emphasizing working memory’s role and its manifestation in neurocognitive outcome measures demonstrating neuroplastic changes related to learning and learned material.**
- **Applications in brain injury, neurodevelopmental disorders, and speech language pathology.**
- **First and second language and literacy acquisition and loss beginning in children and extending to aging populations.**
- **Technical advances: Simultaneous recording of EEG and fMRI and EEG and eye movement activity for basic research on, for example, syntax and semantics, as well as phonological processing and its interaction with orthographic processing. Technical advances will result in applications in typical and atypical populations including problem readers, brain injured individuals, and neurodevelopmental disorders. This work will lead to the development of machine learning tools to advance EEG signal analysis and for new applications in brain-computer interfacing that promise to enable communication in previously non communicative people.**
5. Participants and Membership Criteria:

Full Members

- **Director**, John Connolly, Professor & Chair, Linguistics & Languages; Senator William McMaster Chair in Cognitive Neuroscience
- **Associate Director (Director, MELD)**, Anna Moro, Associate Professor, Linguistics & Languages; Associate Dean of Humanities
- Marc Joanisse, Professor and Faculty Scholar, Department of Psychology & Brain and Mind Institute, University of Western Ontario
- Ivona Kučerová, Assistant Professor of Linguistics & Languages
- Victor Kuperman, Associate Professor of Linguistics & Languages (as of July 1, 2015)
- Daniel Pape, Assistant Professor of Linguistics & Languages (as of July 1, 2015)
- Mike Noseworthy, Associate Professor, Electrical and Computer Engineering, Director of Imaging Physics and Engineering, Imaging Research Centre, St. Joseph’s Healthcare
- Jim Reilly, Professor, Electrical and Computer Engineering
- Elisabet Service, Associate Professor, Linguistics & Languages
- Lyn Turkstra, Professor, Communication Sciences & Disorders, University of Wisconsin-Madison

Associate Members

- Lisa Archibald, Associate Professor, School of Communication Sciences & Disorders, University of Western Ontario
- Carol DeMatteo, Associate Clinical Professor, School of Rehabilitation
- Paul Grunthal, Business Development Manager, McMaster Industry Liaison Office
- Patty Solomon, Professor, Associate Dean (Health Sciences) and Director, School of Rehabilitation Science
- Ranil Sonnadara, Executive Director, Research and High Performance Computing (RHPCS)

Scientists and clinicians/practitioners with research interests and accomplishments in areas related to language research as outlined in the Centre’s research activities are eligible for membership in ARIEAL. Full members of ARIEAL are those with an active basic, applied or clinical research program that is funded or recently funded in an area relevant to the research activities of the centre. Typically, the Director and Associate Director (who will be the Director of MELD) will hold a full time appointment in the Department of Linguistics & Languages at McMaster University. This departmental affiliation criterion for full membership will be revisited at the discretion of the Director and the Governing Board as research activities and goals develop over the life of the Centre (e.g., the further development of interdisciplinary clinical research in cooperation with Health Sciences). Current Department of Linguistics and Languages members consist of those researchers who joined the Centre during the conceptualization and start-up phase of 2013-2014, when the initial research plan and activities were

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2 The Department, the Faculty of Humanities and the Faculty of Health Sciences (P. Solomon) are collaborating in the creation of a Speech Language Pathology post graduate program at McMaster to be offered through Rehabilitation Science.

8 Proposal for the establishment of ARIEAL
developed. The term of Full and Associate members is five years and renewable. Membership in the Centre will be determined by the Governing Board on the recommendation of the Director.

Associate members are those colleagues collaborating with Full members on projects related to the Centre’s research activities. Clinician collaborators of the Centre will also be invited to join as Associate members. For example, the Department of Linguistics & Languages currently has a core SpeechLanguage Pathology (SLP) Working Group (chaired by Moro) that includes Department members and leading SLPs from the Hamilton community, including from Hamilton Health Sciences and St. Joseph’s Healthcare. These SLP colleagues would be candidates for Associate membership status within ARIEAL.

Student membership at the Centre will be open to students enrolled in postgraduate studies (MSc, PhD or MD) at McMaster University, based on research collaborations with Full or Associate members of the Centre that are relevant to the Centre’s goals. Student membership will also include international graduate students associated with international institutions affiliated with the Centre, who are engaged in research training at the Centre.

6. Business Plan:
See Appendix A for a detailed breakdown of expenditures. This section uses year 4 (2018-19) as a representative stable year.

6.1 Annual Expenditures:
Personnel Costs (including F/B costs) $94,500
Travel, Conference and Visiting Speaker Costs $15,000
Equipment, supplies, web maintenance, etc. $8,000
Student support $75,000

Total Annual Expenditures $192,500

Personnel Costs:
The personnel costs include teaching release (one 3 unit course) for the Director ($12,500); the remaining costs ($82,000) are for support staff (one, full-time). The administrative support salary is budgeted at average of $58,500 and assumes a benefit rate of 40%. This person will carry the responsibility for promotional and administrative aspects of Centre research activities (research conferences, visiting speakers, knowledge transfer to graduate student TAs, etc.), be responsible for web-based knowledge mobilization, will assist in assembling infrastructure and research proposals, and will be central to funding activities.

Conference and Visiting Speaker Costs
The anticipated costs cover essential travel related to the main activities of the Centre, visiting speaker costs, and the costs for research conferences.

Student Support
The Centre will provide two one-year, $25,000 research fellowships for graduate students in the Cognitive Science of Language program, one in Applied Linguistics, one in Experimental Linguistics. The
Centre will also provide one $25,000 visiting fellowships for graduate students from the international institutions affiliated with the Centre to attend the Centre for 6-month training periods. In 2016-17 and 2017-18, one additional fellowship will be awarded; other funding will be sought to continue this second fellowship beyond 2017-18.

6.2 Current Committed Revenues:

Start-Up Funding
Dean of Humanities (2014-16) $30,000
VPR (2016-18) $45,000

Annual Ongoing Revenue
Faculty of Humanities* $17,500
McMaster English Language Development Diploma Program6,4 $175,000

Total Annual Committed Revenues $192,500

*$12,500 will be contributed for course time release for the Director. $5,000 will be contributed for research events funded in combination with SSHRC Connection grant applications.

In addition, activities of the Centre will be funded through external research grants.

6.3 Start-Up Funding:

The Dean of Humanities provided $30,000 as a one-time cash start-up contribution to the Centre. This funding was used to complete research planning and develop new collaborations between ARIEAL members that will guide research activities over the Centre’s first three to five years of operation. Based on, and in addition to this research planning, an application — supported by the Faculty of Humanities and McMaster University — was developed and submitted for external infrastructure funding from the Canada Foundation for Innovation (CFI). This proposal, which built upon five previous CFI grants received by ARIEAL members, sought to fund integrated infrastructure supporting collaborative new research in linguistic, language cognition, cognitive neuroscience and engineering. While ultimately unsuccessful, this $2.4M infrastructure proposal demonstrates the Centre’s commitment to research excellence and innovation, and to establishing itself, McMaster, and Canada, as international leaders in experimental and applied linguistics.

The VPR has committed and additional $45,000 to assist the centre to get established.

6.4 MELD Contributions to ARIEAL:

Because of the connections between ARIEAL and the McMaster English Language Development Diploma Program (MELD), revenues from MELD will contribute up to $175,000 annually to ARIEAL, so long as this amount does not exceed 15% of MELD’s surplus. The Dean and the Director will review the annual contribution every two years, to see if it should be adjusted, taking into account the actual annual surplus of MELD, and the financial position of the Faculty of Humanities.
Increases in the MELD contribution and/or fundraising revenues would be used to support activities such as:

- Funding for sustaining the Visiting Student fellow program after 2017-18
- Funding for visiting international scholars with the aim of supporting knowledge exchange to build capacity in linguistics and cognitive science related to language research as well as expertise both within ARIEAL and in the scholars’ home institutions.
- Funding for an additional doctoral fellowship in clinical linguistics will be provided, pending further development of the Centre’s collaboration with Health Sciences.
- Funding for language instruction in underserved language areas (e.g., American Sign Language) through the Department of Linguistics & Languages.

6.5 Physical Resources and Operations Costs:

Connolly and Service currently operate the CFI-funded Language, Memory and Brain Lab, on the 6th floor of Togo Salmon Hall. In 2014, CFI recognized Kuperman with a CFI JELF for his eye-tracking research; this funding will equip a new Reading Lab on the 4th floor of L.R. Wilson Hall, currently under construction. Space in Wilson Hall has been allocated for additional ARIEAL labs and meeting spaces. Research operating funds for these self-supporting labs will continue to be derived from peer-reviewed operating grants including NSERC, CIHR, SSHRC, CFI, NIH, OCE, and the Ontario Brain Institute, with additional funds provided through industry contracts and partnerships.

7. Organizational Structure:
The Centre will be governed by the structures and processes outlined in McMaster University’s Guidelines for the Governance and Review of Research Institutes, Centres and Groups (Dec. 15, 2011). The governance structure is shown in Figure 1.
7.1 Director:
The Director will be a member of the Department of Linguistics & Languages, and will be appointed for a 5-year renewable term. The Director will set the research, academic and business agenda for the Centre in consultation with the Governing Board and the Advisory Committee. The Director will represent the leadership of the Centre, articulate its objectives, determine its milestones and deliverables in consultation with the Core members, and provide the business plan. The Director will report to the Governing Board annually.

7.2 Governing Board and Review:
The Governing Board (GB) will oversee the state of the Centre with regard to direction and operation. Specific issues will include oversight to ensure adherence to the Centre’s business plan, its financial viability, and its progress toward meeting goals. In accordance with University guidelines, the GB will be comprised of the following:

- Dean of Humanities – Chair (or designate)
- Chair of Department of Linguistics & Languages (or designate)
- Director of MELD
- Director of Finance & Administration, Humanities
- Director, School of Rehabilitation Science, Health Sciences
- Executive Director, McMaster Industry Liaison Office (MILO)
- Director, McMaster School of Biomedical Engineering
The Executive Director, McMaster Industry Liaison Office (MILO) will serve the GB in an advisory capacity on matters related to industry partnership, commercialization and IP development and protection.

The performance of the Centre will be reviewed every five years (or sooner at the request of the GB) by an External Review Board (ERB). The ERB will be determined by the Dean of Humanities or designate, and may consist of external or internal reviewers. The ERB is expected to use accepted measures of performance such as publication number and impact, IP development, and funding success, to assess the Centre’s contributions in comparison with those of the Centre during the preceding five years and with the performance of Centres of similar size in the same field of research. The recommendations of the ERB will include the renewal of the Director, and whether the Centre’s performance is consistent with expectations for a Centre at McMaster University. Their report will be submitted in confidence to the Dean of Humanities. Normally, the Dean will share the ERB’s report or major recommendations from the ERB’s report with either the current Director, or the successor to the current Director, so that the leadership of the Centre benefits from the perspective of the ERB.

7.3 Advisory Committee:
The Advisory Committee (AC) will provide advice to the Director with regard to the scientific and scholarly priorities and direction of the Centre, and will be consulted annually or at the discretion of the Director. Advisory Committee members will be appointed for 3-year renewable terms. The composition of the AC is determined by the Director in consultation with the Full Members and Associate Members. Committee membership will be finalized upon final approval of the Centre. Candidates will be drawn from national and international institutions for example: University of Toronto, Haskins Laboratories, Harvard University, Aalto University, Helsinki University, University of Alberta, University of Maryland, New York University, and the Massachusetts Institute of Technology.
## Appendix A: Detailed Yearly Revenue and Expenses

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### Centre Expenses

#### I. Personnel Costs - Includes F/B costs

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<tbody>
<tr>
<td>Teaching Release - Director</td>
<td>$12,500</td>
<td>$12,500</td>
<td>$12,500</td>
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<tr>
<td>Support Staff - Centre Administration</td>
<td>$32,000</td>
<td>$82,000</td>
<td>$82,000</td>
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<tr>
<td>Sessional-teaching: American Sign Language</td>
<td>$8,000</td>
<td>$8,000</td>
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#### II. Equipment

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</thead>
<tbody>
<tr>
<td>Telephone Equipment</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$1,000</td>
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<tr>
<td>Computer Equipment</td>
<td>$5,000</td>
<td>$10,000</td>
<td>$1,500</td>
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<tr>
<td>Office Furniture</td>
<td>$10,000</td>
<td>$500</td>
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#### III. Travel and conferences

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<tbody>
<tr>
<td>Travel</td>
<td>$5,000</td>
<td>$7,500</td>
<td>$7,500</td>
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<tr>
<td>Visiting speaker costs</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
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</tr>
<tr>
<td>Conference costs</td>
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<td>$5,000</td>
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#### IV. Supplies and Expenses

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</thead>
<tbody>
<tr>
<td>Meeting Expenses</td>
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<td>$1,450</td>
<td>$1,450</td>
<td>$1,450</td>
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<td>Postage</td>
<td>$350</td>
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<td>Printing and Photocopying</td>
<td>$250</td>
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<tr>
<td>Stationery and Office Supplies</td>
<td>$1,000</td>
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<td>$1,000</td>
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<tr>
<td>Web development</td>
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<td>$450</td>
<td>$450</td>
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<tr>
<td>Telephone/Long Distance</td>
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<td>$1,000</td>
<td>$1,000</td>
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#### V. Student Support

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<tbody>
<tr>
<td>ARIEAL Doctoral Fellowship in Applied Linguistics</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>ARIEAL Doctoral Fellowship in Experimental Linguistics</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>ARIEAL Visiting Student Fellow program</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
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<tr>
<td>ARIEAL Visiting Student Fellow program</td>
<td>$25,000</td>
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### ONE-TIME COST - proposal/centre development

| Proposal/centre development | $30,000 |

| Total Operating Costs | $124,550 | $237,750 | $220,000 | $192,500 |
| Balance - surplus/(deficit) | $0 | $67,950 | $52,700 | $40,200 | $40,200 |

- Proposal for the establishment of ARIEAL
Notes and Assumptions

1. MELD contribution is based on a steady enrolment of between 65 and 70 students. Current enrolment in 2015-16 exceeds that number.

2. Revenues from researchers’ grants are not included in the costs/revenues of the general operation of the Centre.

3. Even though biennial conferences are planned, conference expenses are reflected yearly to ensure the availability of adequate ongoing funds for conference planning purposes.

4. The second international graduate student fellowships will be sustained after 2017-18 only if funding becomes available.
REPORT TO SENATE

FROM THE

COMMITTEE ON APPOINTMENTS

Open Session

At its meetings on January 18 and 20, 2016, the Committee on Appointments approved the following recommendations and now recommends them to Senate for approval:

i. Proposed Terms of Reference for Director and Associate Directors of the Walter G. Booth School of Engineering Practice and Technology (Attachment I)

ii. Proposal to Establish the Frederick Hargreave / Teva Innovation Chair in Airway Diseases (Attachment II)

Senate: For Approval
February 10, 2016
MEMORANDUM

Date: January 6, 2016
To: Senate Committee on Appointments
CC: David Wilkinson, Provost
From: Ishwar Puri, Dean and Professor
SUBJECT: Establishment of Terms of Reference for the Director and 3 Associate Directors of the proposed Walter G. Booth School of Engineering Practice and Technology

The Faculty of Engineering established the SEP-SET Merger Committee in April 2015. This Committee discussed the terms of the proposed merger between the Walter G. Booth School of Engineering Practice (SEP) and the School of Engineering Technology (SET), including how the rights and privileges afforded to existing faculty and staff members will be respected. It also explored synergies between existing programs and how these would be leveraged to create new programs as well as strengthen existing programs.

After much review and discussion, the SEP-SET Merger Committee recommended that the Walter G. Booth School for Engineering Practice and the School of Engineering Technology be closed. The Committee further recommended that a new School be established named the Walter G. Booth School of Engineering Practice and Technology. The full details pertaining to this recommendation were forwarded to the University Planning Committee on December 7th, 2015 and approved by UPC on December 16th, 2015. This recommendation is now pending approval by Senate and the Board of Governors.

The proposed governance for newly established School is as follows:

It is recommended that the Walter G. Booth School of Engineering Practice and Technology be led by a Director reporting to the Dean of Engineering. The Director will be a 5 year term appointment made by the Senate.

It is recommended that there be three Associate Directors reporting to the Director:

- Associate Director, Graduate Programs
- Associate Director, Undergraduate Degree Completion Programs
- Associate Director, Undergraduate Four-Year Programs

Associate Director Appointments will be 3-year appointments made by the Director of the Walter G. Booth School of Engineering Practice and Technology in consultation with the Dean.
of Engineering. These appointments will be similar to those of the Associate Chairs in Departments.

Attached for your review and approval are the Terms of Reference for the Directorship as well as the three Associate Director positions.

The Faculty would like to propose that the Director appointment be forwarded to Senate Committee on Appointments for approval and the three Associate Director appointments for information once successful candidates have been identified for each of the positions.

Thank you.

/mm
Director, Walter G. Booth School of Engineering Practice and Technology
[Jan 5, 2016]

Terms of Reference

Reporting:
Dean of Engineering, McMaster University

Background and Primary Purpose:
The Director of the Walter G. Booth School of Engineering Practice and Technology is responsible for leadership in developing and implementing undergraduate and graduate academic programs and for the operation of these programs.

The Director is at a central point in the administration, representing the School in Faculty and University affairs, and leading and managing the affairs of the School.

The Director is nominated by an ad hoc Selection Committee appointed by the Dean of Engineering who closely follows the Procedure for Selecting Departmental Chairs. The nomination must be endorsed by the Senate Committee on Appointments and is forwarded to the Senate for approval and then to the Board of Governors for final ratification. The Director will serve for a term of five years although in rare cases this term might be shorter. The term will be renewable for a second term of up to five years. In extraordinary circumstances the Chair may be appointed for a third consecutive term, or for a term of less than five years.

The Director is the chief executive officer of the School and is responsible to the Dean of the Faculty. The Director or a delegate represents the School in any matters dealing with the School, Faculty or University policy, curriculum, appointments, and nominations to committees. The Director is responsible for the management of the School's physical, financial and human resources, ensuring that they are utilized as effectively as possible to meet both the short-term and long-term objectives of the School, the Faculty and the University.

In essence, the duties of the Director are to foster a healthy climate within the School for the conduct of scholarship, teaching and service, a climate which is inclusive, in which School members receive equitable treatment and support, and in which procedures are open and visible. Many of the responsibilities of the Director are carried out through delegating duties to the members of the School and to support staff. In addition to responsibilities explained in Terms of Reference for Department Chairs approved by Senate on May 20, 1981 and ratified by the Board of Governors on June 24, 1981 (please
see attached), the Director is also responsible for specific accountabilities related to the Walter G. Booth School of Engineering Practice and Technology:

A. Strategic Planning

1. Provides innovative leadership in initiating new programs as well as performing continuous evaluations on current programs to meet societal needs

2. Develops strategies to improve the quality of teaching and teaching methodologies within the School

3. Develops strategies to successfully manage the B.Tech. Partnership with Mohawk College

4. Develops strong linkages, including funding partnerships, with stakeholder groups in the industrial and business community and with local, provincial and governmental agencies

5. Oversees the development and execution of marketing and recruitment activities to increase enrollment and quality of students entering the Walter G. Booth School of Engineering Practice and Technology programs

B. Relationships

1. Accountable to the Dean of Engineering for overall direction and operation of programs and activities, and to the B.Tech. Partnership Steering Committee for overall direction and operation of programs and activities conducted by the Partnership

2. Supervises Associate Directors who may be delegated operational responsibility for programs

3. Provides overall leadership of Program Advisory Committees

C. Budget and Resource Management

1. Monitors operational and financial performance within the parameters set by the Dean and for B.Tech. programs within the parameters set by the B.Tech. Partnership Steering Committee
Director, Walter G. Booth School of Engineering Practice and Technology  
[Jan 5, 2016]  

Terms of Reference  

Reporting:  
Dean of Engineering, McMaster University  

Background and Primary Purpose:  
The Director of the Walter G. Booth School of Engineering Practice and Technology is responsible for leadership in developing and implementing undergraduate and graduate academic programs and for the operation of these programs.  

The Director is at a central point in the administration, representing the School in Faculty and University affairs, and leading and managing the affairs of the School.  

The Director is nominated by an ad hoc Selection Committee appointed by the Dean of Engineering who closely follows the Procedure for Selecting Departmental Chairs. The nomination must be endorsed by the Senate Committee on Appointments and is forwarded to the Senate for approval and then to the Board of Governors for final ratification. The Director will serve for a term of five years although in rare cases this term might be shorter. The term will be renewable for a second term of up to five years. In extraordinary circumstances, the Chair may be appointed for a third consecutive term, or for a term of less than five years.  

The Director is the chief executive officer of the School and is responsible to the Dean of the Faculty. The Director or a delegate represents the School in any matters dealing with the School, Faculty or University policy, curriculum, appointments, and nominations to committees. The Director is responsible for the management of the School’s physical, financial and human resources, ensuring that they are utilized as effectively as possible to meet both the short-term and long-term objectives of the School, the Faculty and the University.  

In essence, the duties of the Director are to foster a healthy climate within the School for the conduct of scholarship, teaching and service, a climate which is inclusive, in which School members receive equitable treatment and support, and in which procedures are open and visible. Many of the responsibilities of the Director are carried out through delegating duties to the members of the School and to support staff. In addition to responsibilities explained in Terms of Reference for Department Chairs approved by Senate on May 20, 1981 and ratified by the Board of Governors on June 24, 1981 (please
see attached), the Director is also responsible for specific accountabilities related to the Walter G. Booth School of Engineering Practice and Technology:

A. Strategic Planning

1. Provides innovative leadership in initiating new programs as well as performing continuous evaluations on current programs to meet societal needs

2. Develops strategies to improve the quality of teaching and teaching methodologies within the School

3. Develops strategies to successfully manage the B.Tech. Partnership with Mohawk College

4. Develops strong linkages, including funding partnerships, with stakeholder groups in the industrial and business community and with local, provincial and governmental agencies

5. Oversees the development and execution of marketing and recruitment activities to increase enrollment and quality of students entering the Walter G. Booth School of Engineering Practice and Technology programs

B. Relationships

1. Accountable to the Dean of Engineering for overall direction and operation of programs and activities, and to the B.Tech. Partnership Steering Committee for overall direction and operation of programs and activities conducted by the Partnership

2. Supervises Associate Directors who may be delegated operational responsibility for programs

3. Provides overall leadership of Program Advisory Committees

C. Budget and Resource Management

1. Monitors operational and financial performance within the parameters set by the Dean and for B.Tech. programs within the parameters set by the B.Tech. Partnership Steering Committee
Reporting:
Director, Walter G. Booth School of Engineering Practice and Technology

Primary Purpose:
Under the direction of the Director, the Associate Director, Degree Completion Programs (DCP), is responsible for leadership in developing, implementing and operating the DCP in the Walter G. Booth School of Engineering Practice and Technology

Specific Accountabilities

A. Strategic Planning

1. Provides innovative leadership in initiating new DCP as well as performing continuous evaluations on current programs to meet societal needs

2. Develops strategies to successfully manage the DCP so that they operate effectively and efficiently

3. Determines instructional requirements for the DCP based on enrollment projections and industry advice

B. Relationships

1. Accountable to the Director of the Walter G. Booth School of Engineering Practice and Technology for overall direction and operation of the DCP and related activities

2. Provides overall leadership of faculty and staff involved in delivery of the DCP and, under the direction of the Director, oversees the Program Chairs of the DCP

3. Develops and maintains relationships with adjunct faculty, sessional instructors and others who are involved in the delivery of the DCP

C. Academic Progress and Enrollment

1. Monitors the enrollment of students within the DCP

2. Monitors the academic progress of students within the DCP

3. Designs and implements innovative strategies to facilitate student success in the DCP
D. Curriculum Management

1. Provides leadership through the Program Chairs in relation to curriculum planning and development for DCP to meet academic and industry changing requirements

2. Proposes curriculum changes on behalf of the Director for the DCP based on McMaster policies

Selection:

Similar to current practice for the appointment of Associate Department Chairs in the Faculty of Engineering, the Director of the Walter G. Booth School of Engineering Practice and Technology will recommend the appointment of the Associate Director, Degree Completion Programs, to the Dean of the Faculty of Engineering. The Dean will consider this recommendation and, once a recommendation is accepted, the Dean will appoint the Associate Director, Degree Completion Programs, and forward the information to the Senate Committee on Appointments.
Walter G. Booth School of Engineering Practice and Technology
Associate Director, Four-Year Degree Programs

Terms of Reference (January 4, 2016)

Reporting:
Director, Walter G. Booth School of Engineering Practice and Technology

Primary Purpose:
Under the direction of the Director, the Associate Director, Four-Year Degree Programs, is responsible for leadership in developing, implementing and operating four-year degree undergraduate programs in the Walter G. Booth School of Engineering Practice and Technology

Specific Accountabilities

A. Strategic Planning

1. Provides innovative leadership in initiating new four-year degree programs as well as performing continuous evaluations on current programs to meet societal needs

2. Develops strategies to successfully manage the four-year degree programs so that they operate effectively and efficiently

3. Determines instructional requirements for the four-year degree programs based on enrollment projections

B. Relationships

1. Accountable to the Director of the Walter G. Booth School of Engineering Practice and Technology for overall direction and operation of four-year degree programs and related activities

2. Provides overall leadership of faculty and staff involved in delivery of four-year degree programs and, under the direction of the Director, oversees the Program Chairs of the four-year programs

3. Develops and maintains relationships with adjunct faculty, sessional instructors and others who are involved in the delivery of four-year degree programs

C. Academic Progress and Enrollment

1. Monitors the enrollment of students within the four-year degree programs

2. Monitors the academic progress of students within the four-year degree programs

3. Designs and implements innovative strategies to facilitate student success in the four-year degree programs
D. Curriculum Management

1. Provides leadership through the Program Chairs in relation to curriculum planning and development for the four-year programs to meet academic and industry changing requirements

2. Proposes curriculum changes on behalf of the Director for the four-year programs based on McMaster policies

Selection:
Similar to current practice for the appointment of Associate Department Chairs in the Faculty of Engineering, the Director of the Walter G. Booth School of Engineering Practice and Technology will recommend the appointment of the Associate Director, Four-Year Degree Programs, to the Dean of the Faculty of Engineering. The Dean will consider this recommendation and, once a recommendation is accepted, the Dean will appoint the Associate Director, Four-Year Degree Programs, and forward the information to the Senate Committee on Appointments.
Walter G. Booth School of Engineering Practice and Technology
Associate Director, Graduate Programs

Terms of Reference (January 4, 2016)

Reporting:
Director, Walter G. Booth School of Engineering Practice and Technology

Primary Purpose:
Under the direction of the Director, the Associate Director, Graduate Programs, is responsible for leadership in developing, implementing and operating graduate programs in the Walter G. Booth School of Engineering Practice and Technology

Specific Accountabilities

A. Strategic Planning

1. Provides innovative leadership in initiating new graduate programs as well as performing continuous evaluations on current programs to meet societal needs

2. Develops strategies to successfully manage graduate programs so that they operate effectively and efficiently

3. Develops strong linkages with stakeholder groups in the industrial and business community and with local, provincial and governmental agencies

B. Relationships

1. Accountable to the Director of the Walter G. Booth School of Engineering Practice and Technology for overall direction and operation of graduate programs and related activities.

2. Provides overall leadership of faculty and staff involved in delivery of graduate programs.

3. Develops and maintains relationships with adjunct faculty, sessional instructors and others who are involved in the delivery of graduate programs.

C. Academic Progress and Enrollment

1. Monitors the enrollment of students within the graduate programs

2. Monitors the academic progress of students within the graduate programs

3. Designs and implements innovative strategies to facilitate student success in the graduate programs
D. Curriculum Management

1. Provides overall leadership of faculty and staff in relation to curriculum planning and development for the graduate programs to meet academic and industry changing requirements.

2. Proposes curriculum changes on behalf of the Director for the graduate programs based on McMaster policies.

Selection:
Similar to current practice for the appointment of Associate Department Chairs in the Faculty of Engineering, the Director of the Walter G. Booth School of Engineering Practice and Technology will recommend the appointment of the Associate Director, Graduate Programs, to the Dean of the Faculty of Engineering. The Dean will consider this recommendation and, once a recommendation is accepted, the Dean will appoint the Associate Director, Graduate Programs, and forward the information to the Senate Committee on Appointments.
January 11, 2016

Senate Committee of Appointments  
c/o University Secretariat  
Gilmour Hall, Room 210

Re: Establishment of the Frederick Hargreave/Teva Innovation Chair in Airway Diseases

On behalf of the Faculty of Health Sciences, I would like to recommend the establishment of the Frederick Hargreave/Teva Innovation Chair in Airway Diseases.

Teva Branded Pharmaceutical Products, Inc. has generously provided funds to permanently support a Chair at McMaster University in honour of the late Dr. Frederick Hargreave. The Department of Medicine has also committed annual installments of matching funds. The Chair will help support research into airway diseases.

The terms of reference for the Chair are attached.

Yours sincerely,

John G. Kelton, MD  
Dean & Vice-President

Encl.

JGK/r1
TERMS OF REFERENCE

Frederick Hargreave/Teva Innovation Chair in Airway Diseases

General

A transfer of funds has been directed to the Faculty of Health Sciences to provide support for the Frederick Hargreave/Teva Innovation Chair in Airway Diseases. The incumbent will have demonstrated excellence in the area of airway diseases.

Details and Duties

The holder of the Chair shall be an individual with sufficient research, education and/or clinical experience.

Specifically, the chairholder will:

- Hold a full-time appointment in the Department of Medicine in the Faculty of Health Sciences at McMaster University;

- Be an integral part of the institutional vision towards establishing and maintaining a world-class program in airway diseases research which exemplifies the central values of the University and the Department of Medicine;

- Contribute significantly to the body of scholarship in the area of airway diseases, through teaching, research and/or clinical work at McMaster University;

- Undertake the normal duties of a faculty member in the Faculty of Health Sciences and the Department of Medicine, including participation in the education programs of the Department.

Selection Process

The Dean and Vice-President of the Faculty of Health Sciences will appoint an appropriate ad-hoc selection committee which shall include, at minimum, the Associate Dean, Research and the Chair of the Department of Medicine. The Committee will forward its recommendation to the Senate Committee on Appointments.

Term

An appointment to the Frederick Hargreave/Teva Innovation Chair in Airway Diseases shall be for up to five (5) years, with the understanding that renewal for additional terms is possible.

Acknowledgement

The incumbent will acknowledge that she/he holds the “Frederick Hargreave/Teva Innovation Chair in Airway Diseases” in all publications, lectures and any other activities supported through the fund.

January 2016