



York University Senate

Notice of Meeting

Thursday, March 28, 2019, 3:00 pm

Dr Robert Everett Senate Chamber, N940 Ross Building

AGENDA

Page

- 1. Chair’s Remarks (F. van Breugel)
- 2. Business Arising from the Minutes
- 3. Inquiries and Communications
- 4. President’s Items (L. Philipps)
 - a. Kudos Report 1

Committee Reports

- 5. Executive Committee (D. Mutimer)5
 - a. Senate Membership for 2019-2021 (Notice of Statutory Motion)
- 6. Academic Policy, Planning and Research (L. Jacobs)..... 9
 - a. Incomparable Metrics: E-CV: Developing the platform (R. Haché)
 - b. Complement Renewal Strategy: Provostial Discussion Paper (L. Philipps)
- 7. Academic Standards, Curriculum and Pedagogy (K. Michasiw) 12
 - a. Establishment of a Master of Management in Artificial Intelligence Degree Type and Program (Statutory), Schulich School of Business / Graduate Studies (Appendix A)
- 8. Awards Committee..... 25
- 9. Other Business

M. Armstrong, Secretary

Consent Agenda

Consent agenda items are deemed to be approved or received unless, prior to the start of the meeting, one or more Senators ask that they be dealt with as regular business.

- 10. Minutes of February 28, 2019 Meeting 28

York University Senate

11. Senators on the Board Governors re: Synopsis of the Board Meeting of February 26, 2019 (D. Mutimer / G. Tourlakis) (for information)..... 37
12. Changes to Degree Requirements and Program Learning Outcomes for the Master of Business Analytics Program, Schulich School of Business/ Faculty of Graduate Studies (page 13)
13. Changes to Requirements for the Graduate Diploma in Intermediate Accounting, Schulich School of Business /Faculty of Graduate Studies (page 14)
14. Changes to Degree Requirements for the Master of Accounting Program, Schulich School of Business/Faculty of Graduate Studies (page 15)
15. Changes to Degree Requirements and Program Learning Outcomes for the MA program in Economics, Department of Economics, Faculty of Liberal Arts & Professional Studies/Faculty of Graduate Studies (page 16)
16. Changes to the Requirements for Certificate in Anti-Racist Research and Practice, Department of Equity Studies, Faculty of Liberal Arts & Professional Studies (page 16)
17. Changes to the Requirements for the Certificate in Indigenous Studies, Department of Equity Studies, Faculty of Liberal Arts & Professional Studies (page 17)
18. Establishment of a Consecutive Option for the Certificate in Black Canadian Studies, Department of Humanities, Faculty of Liberal Arts & Professional Studies (page 18)
19. Transfer Credits from the School of Dance to the BFA (Honours) program in Dance, School of the Arts, Media, Performance and Design (page 19)
20. Establishment of a stream in Financial Mathematics within the Specialized Honours BA and BSc programs in Applied Mathematics, Department of Mathematics and Statistics, Faculty of Science (page 20)
21. Closure of the Specialized Honours BSc program in Computational Mathematics, Department of Mathematics and Statistics, Faculty of Science (page 21)

Appendices

Academic Policy, Planning & Research Committee

- Appendix A: Discussion Paper and Action Plan on Achieving Planning Goals While Moving Towards Incomparable Metrics 41

Academic Standards, Curriculum and Pedagogy Committee

- Appendix A: Establishment of the Degree of Master of Management in Artificial Intelligence, Schulich School of Business, Faculty of Graduate Studies 66

Awards Committee

- 2017-2018 Undergraduate Award Disbursement Report..... 130
- 2017-2018 Graduate Award Disbursement Report..... 141

PRESIDENT'S KUDOS REPORT

MARCH 2019



Alumna [Lilly Singh](#) (BA '10) has been named host of "A Little Late With Lilly Singh" on NBC, making her the first woman of colour to host a daily late-night show on a major US network.



Biology professor [Jennifer I-Ling Chen](#) was awarded the 2019 Fred Beamish Award from the Canadian Society of Chemistry in recognition of her innovative research in the field of analytical chemistry.



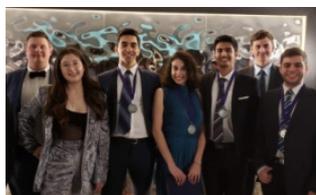
Schulich and Osgoode students [Farzad Tabaei](#) (MBA/JD '19) and [Shane Morganstein](#) (MBA/JD '20) won second-place overall in the International Chamber of Commerce (ICC) International Commercial Mediation Competition held in Paris, France.



A team of Osgoode Hall Law School students, Matthew Stanton, Andrew Coates, Nancy Walpole, Samiyyah Ganga and Kenny Hildebrand, and their coaches, Professors Shelley Kierstead and Michael Tweyman, won first place at the [Walsh Family Law Moot](#) for the second year in a row. Students Ana Siqueira Cabral and Biancha-Nikollette Jacob-Okorn also received the top Representation Plan award at the Walsh Family Law Negotiation Competition.



Three teams represented Lassonde at the [Canadian Engineering Competition](#), a highly selective annual event that admits only the top 150 engineering students nationwide. Lassonde's Programming Team, composed of Julia Paglia, Shawn Verma, Josh Abraham and Amer Alshoghri, came in second place.





Alumnus [David J. Chariandy](#) (PHD '02) is among eight writers from around the world to receive the 2019 Windham-Campbell Prize, an anonymously judged literary award worth \$165,000 U.S. (approx. \$218,790 Cdn). The grant is awarded to poets and writers of fiction, non-fiction and drama in support of their literary pursuits.



York Lions athlete [Jenna Gray](#) was awarded the U SPORTS 2018-19 Marion Hilliard Award, which recognizes excellence in the areas of athletics, academics and community involvement by a women's hockey student-athlete.



The World University Services of Canada (WUSC) recently awarded York University's student [Keele Campus Local Committee](#) the 2018 Local Committee of the Year Award, the highest award given at the organization's annual international forum. WUSC is a non-profit dedicated to improving education, employment and empowerment opportunities for youth around the world.



Two Department of History researchers were recognized at the Lieutenant-Governor's Ontario [Heritage Awards](#) for Excellence in Conservation:

- Gilberto Fernandes, a postdoctoral fellow at the Robarts Centre for Canadian Studies and the History Department, was recognized for his work on "City Builders: A History of Immigrant Construction Workers in Post-war Toronto."
- Carolyn Podruchny, associate professor of history, also won an Excellence in Conservation Award for her project, "The Manitoulin Island Summer Historical Institute," a seven-day summer project focused on promoting critical dialogue between Anishinaabe elders and knowledge carriers and university-based scholars and students.



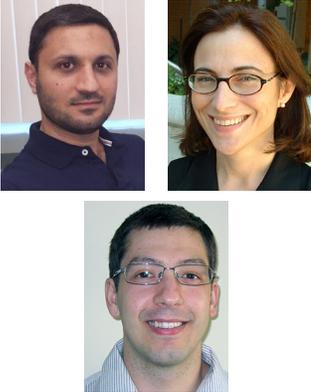
Department of Electrical Engineering and Computer Science PhD student [Maryam Keyvanara](#) was awarded the inaugural Mercedes T. Richards & Jane St. Amour Award in Engineering.



York University officially opened its new [Korean Office for Research & Education](#) (KORE) and launched a five-year project, "Korea in the World, the World in Korean Studies," with a \$1.15-million award from the Academy of Korean Studies.



A team of fourth-year undergraduate students - [Adi Tzadok](#), [Sarah Lord](#) and [Daniel Levinsky](#) - from the Schulich School of Business earned second-place at the L'Oréal Brandstorm marketing competition in Montreal. This year's national case competition focused on innovation in the beauty industry and invited teams of three students to create the skincare experience of the future for health-conscious consumers. In addition to the second-place team, another team from Schulich also secured a spot in the finals.



Three York University professors have been awarded funding from the [Canadian Institutes of Health Research](#) (CIHR) Fall 2018 competition:

- Ali Abdul Sater, an assistant professor in the School of Kinesiology & Health Science, Faculty of Health, is principal investigator on a five-year project that has been awarded a CIHR grant of \$803,250;
- Mary Fox, an associate professor in the School of Nursing, Faculty of Health, and a member of YU-CARE, is principal investigator on a three-year project that will receive \$321,300 in CIHR funding;
- and Michael Rotondi, an associate professor in the School of Kinesiology & Health Science, Faculty of Health, will receive a \$100,000 grant for a one-year project that will enable his team to develop new statistical methods to improve measurement of urban Indigenous children's health.



A team of students from [Glendon's Master's in Public & International Affairs](#) (MPIA) program earned second place at this year's National Public Administration Student Case Competition. The team, which was coached by Professor Francis Garon and BMO Visiting Fellow Andrew Mackay, included graduate students Mona Awwad, Andrea Garland, Monica Smith and Kyler Woodmass.



Twelve graduating Osgoode Hall Law School JD students received the [2019 Dean's Gold Key Awards](#) for outstanding contribution to the life of the Law School:

- Manuela Morales
- Aashish Oberoi
- Adam Veenendaal
- Hana Bell
- Elisa Mastroiello
- Rick Frank
- Jerico Espinas
- Angela Yenssen
- Yadesha Satheaswaran
- Alana Robert
- Scott Lin
- Shanice Prendergast [not pictured]



York University track and field team members [Pierce Lepage](#) and [Brittany Crew](#) were named the 2019 U SPORTS field athletes of the year in recognition of their outstanding seasons. Pierce won a silver medal at the 2018 Commonwealth Games and is currently ranked among the best decathletes in the world, while Crew won a bronze medal in shot put at the 2018 Commonwealth Games and is one of the most decorated athletes in the history of the Lions women's track & field team.



Three Osgoode Hall Law school alumni received [awards by the Ontario Bar Association](#) for their contributions to the practice of law in Ontario and to the Ontario Bar Association:

- John R. Cockburn ('60) is a recipient of the Joel Kuchar Award for Professionalism and Civility;
- Eva E. Marszewski ('73) is a recipient of the Award for Distinguished Service;
- and the Honourable Justice Patricia C. Hennessy ('79) is a recipient of the OBA President's Award.



First-year Osgoode Hall Law School JD student Fahamida Zahan served as the 2019 Dean for a Day on March 14. Her [winning essay submission](#) offers advice to Osgoode's next Dean.

APPOINTMENTS



[Sarah Bay-Cheng](#), Chair and Professor of Theater and Dance at Bowdoin College in Brunswick, Maine, has been appointed Dean of York University's School of the Arts, Media, Performance & Design.



[Professor Norma Sue Fisher-Stitt](#) will take on the role of interim associate vice-president teaching and learning, effective July 1 for a one-year period.



Two York alumni were elected to the House of Commons in the most recent federal byelection:

- Jagmeet Singh (LLB '05) - Member of Parliament for Burnaby South
- Scot Davidson (BA '93) - Member of Parliament for York-Simcoe



AMPD alumnus [Francoa Boni](#) was appointed artistic director of thePuSh International Performing Arts Festival in Vancouver.

Executive Committee – Report to Senate

At its meeting of March 28, 2019

Notice of Statutory Motion

1. Senate Membership 2019-2021

It is the intention of Senate Executive to put the following statutory motion to Senate:

That Senate approve the membership of Senate for the period July 1, 2019 to June 30, 2021 with a maximum of 168 and distribution as follows:

Members specified by the York Act (Total of 21)

Chancellor (1)

President (1)

Vice-Presidents (5)

Deans and Principal (11)

University Librarian (1)

Two-to-four members of Board (2)

Faculty Members Elected by Faculty Councils (Total of 99)

Arts, Media, Performance and Design 7 (minimum of 2 chairs)

Education 4

Environmental Studies 4

Glendon 8 (minimum of 1 Chair)

Health 12 (minimum of 2 Chairs)

Lassonde 8 (minimum of 1 Chair)

Liberal Arts & Professional Studies 36 (minimum of 13 Chairs and 2 contract faculty members)

Osgoode 4

Schulich 5

Science 11 (minimum of 2 Chairs)

Librarians (Total of 2)

Students (Total of 28)

2 for each Faculty except 6 for LA&PS

Graduate Student Association (1)

York Federation of Students (1)

Other Members (Total of 13)

Chair of Senate (1)

Vice-Chair of Senate (1)

Secretary of Senate (1)

Academic Colleague (1)

President of YUFA (1)

YUSA Member (1)

Member of CUPE 3903 (1)

Alumni (2)

College Masters (1)

Registrar (1)

Vice-Provost Academic (1)

Vice-Provost Students (1)

Chairs of Senate Committees who are not otherwise Senators (Estimated at a maximum of 5)

Executive Committee – Report to Senate

Rationale

Section B, 3 (Periodic Review and Publication of Senate Membership Reviews) stipulates that “Senate Executive shall review changes in structures, faculty complements and student enrolments every two years...” The Executive Committee embarked on the process of review in anticipation of presenting recommendations to Senate in November. Changes in membership are statutory in nature and involve notice of motion at the first stage of revisions.

The allocation of seats for full-time faculty members elected by Councils is determined by first calculating the proportion of the overall complement attributable to each Faculty (tenure stream, alternate stream and CLAs) based on the most recently available data. Percentages are then applied to the full-time faculty member seats on Senate.

Minor adjustments are necessary because of the following considerations:

- the addition of a new Vice-Presidential portfolio of Equity, People and Culture, resulting in an increase to the total number of Senators (changes noted in red)
- it has been a long-standing rule that no Faculty shall have fewer than four faculty member seats, and two Faculties (Education and Environmental Studies) receive additional seats according to this stipulation
- since 2013, Glendon has been allocated two more seats than a strictly proportional formula yields by virtue of its special nature (an allocation confirmed by Senate in 2015)

The Committee does not recommend any changes in student membership. The relatively large size of the student population in Liberal Arts and Professional Studies continues to justify the allocation of four seats more than other Faculties.

No recommendation is made at this time regarding an allocation of membership for the possible campus in Markham. Changes to membership rules can be instituted at any time, and a recommendation can be made as the Markham situation becomes clearer.

FOR INFORMATION

2. Special Joint Senate-Board Working Group on Jurisdiction Related to the Cancellation/Suspension of Classes during a Labour Disruption

It was the decision of Senate in February to establish a *Special Joint Senate-Board Working Group on Jurisdiction Related to the Cancellation / Suspension of Classes during a Labour Disruption*. Senate’s members on the Work Group are to be elected from among current Senators. In accordance with the process set for the nomination and selection of the Senate members, the call for nominations was distributed via the Senate list-serve on March 1, providing 2 weeks for nominations to be received by March 15. The election by ballot through an e-vote was set for March 18-22, 2019.

Executive Committee – Report to Senate

No nominations for the Senate members on the Group were received through the call. The Executive Committee discussed the scenario, reflecting on the purpose and goals of the process. It remains persuaded of the value of a collaborative exercise among members of the York community to explore a possible new shared process to govern the cancellation / suspension of classes during a labour disruption, and to also identify needed enhancements to relevant Senate policies. Every effort should be made by Senate to engage in an earnest attempt to reach an internal resolution on a matter of critical importance to the University. First and foremost, students deserve clarity and a resolution to the issue.

The Committee realized the process was being launched just as the hectic end-of-year pace was starting. In addition, it has been an extremely busy academic session across the University, with high numbers of hiring committees active in many Faculties and several decanal searches in progress. Perhaps at play as well, particularly for student Senators, is the time commitment for the Working Group, which includes some activity over the summer months.

Reiterating the significance of this issue to the University and the worth of trying to seek a way forward under York's own pen, the Executive Committee, urges Senators to consider participating in this collegial process. The **nomination period therefore remains open until Wednesday, April 10 for either self-nominations or nominations of another Senator**. It is anticipated that a slate of nominees will be confirmed and an election held between April 15 – 22, 2019.

Information about the Working Group, including its Terms of Reference, is posted at - <https://secretariat.info.yorku.ca/special-joint-senate-board-working-group/> . The direct link to the online **nomination form** is posted at - <https://univsec.apps01.yorku.ca/forms/view.php?id=11811>.

3. Approval of Committee Members Nominated by Faculty Councils

The Committee has approved the following individual nominated by Faculty Councils for membership on Senate committees with terms beginning July 1, 2018 and ending June 30, 2021.

Academic Policy, Planning and Research

Eva Peisachovich, School of Nursing, Faculty of Health.

4. Senate Rules, Procedures & Guidelines Review

One of Senate Executive's priorities for the year is a review of the Senate Rules. That aligns with the Rule (Section A, II, 2. a) that "not less frequently than every three years an updated version of Senate's Rules, Procedures and Guidelines shall be published online." This stipulation occasions thorough reviews of rules, procedures and guidelines. The last such review culminated with a number of editorial and substantive changes approved by Senate in February 2016.

Executive Committee – Report to Senate

A list of suggestions and questions for this round of Rules review was compiled from the following sources:

- Direct requests made of the Committee
- Senate Executive commentaries on rules in March and June 2018
- Excerpts from Senate minutes
- Comments in the 2018 survey of Senators

That preliminary inventory of topics was distributed to Senators in November with a call for other aspects of Senate rules that should be in scope.

Drawing on the comprehensive input from Senators and recommendations from the Nominations Sub-committee, Executive had a preliminary discussion of core issues and areas of the Rules it believes should be captured in this year's exercise toward the goal of enhancing processes and the flow of meetings. Recommended revisions to the Rules will be brought forward to Senate for approval this spring, beginning with a Notice of Statutory Motion likely in May.

5. Review of Faculty Council Rules and Procedures

The Committee has reviewed changes in rules and procedures submitted by the Health Faculty Council, and confirmed that they are consistent with principles of collegial governance and practices elsewhere in the University. The changes are as follows:

- The establishment of a Graduate Committee as a standing committee of its Faculty Council and concomitant minor changes to the existing Curriculum Committee
- Clarifications to its student membership rules and composition on Council

6. Additions to the Pool of Prospective Honorary Degree Recipients

In a confidential report from the Sub-Committee, the Senate Executive received recommendations to add individuals to the pool of prospective recipients of honorary degrees. The Committee concurred with the recommendations and, as a result, two new candidates have been deemed eligible for honorary degrees.

Franck van Breugel, Chair
David Mutimer, Interim Vice-Chair



Academic Policy, Planning and Research Committee

Report to Senate

At its meeting of March 28, 2019

FOR INFORMATION

APPRC met on March 7 and 21 and submits the following report for information.

1. Incomparable Metrics: Presentation and Discussion

This past Fall APPRC produced a *Discussion Paper and Action Plan on Achieving Planning Goals While Moving Towards Incomparable Metrics*. It is attached as Appendix A for Senate. The initiative has its genesis in the Committee's efforts to enhance data analytics to better support tracking of UAP progress, which began in earnest in 2016. APPRC re-affirmed its commitment to this initiative this year by including it among its priorities for 2018-2019.

The term "Incomparable Metrics" was adopted to signal an intention to develop inclusive indicators that tell the York scholarship story well, document our strengths, values and impact, and address the concerns about the limitations of conventional measures. It was also hoped this approach to metrics could help shape system-wide indicators for use in the Strategic Mandate Agreement - 3 (SMA). The APPRC Discussion Paper briefly summarizes the history of the initiative and describes the first phases of actions taken toward fostering comprehensive research indicators, measures, and metrics to track progress on York's academic priorities.

The second component of the document is an Action Plan. Among the items on that Plan is the transmittal of the Discussion Paper to Senate coincident with a facilitated discussion of metrics at Senate to garner further input from the collegium. Work has been progressing on several aspects to enhance the ability to track indicators, with projects under the leadership of the Vice-President Research & Innovation and the Libraries showing considerable potential to advance the goals of the incomparable metrics priority. APPRC wishes to keep Senate informed of these developments and afford Senators the opportunity to contribute through discussion and feedback. To that end, at this meeting Senators will receive and be asked to engage with a presentation by the Vice-President Research & Innovation on the development of an **E-CV platform**, underscoring its capacity to collect inclusive quantitative and qualitative indicators that tell the York research story in a fairer, fuller way.

An additional related initiative in progress is the development of a Senate Policy on Open Access. APPRC anticipates bringing it forward for Senate approval this spring.

The committee looks forward to a robust discussion.

Academic Policy, Planning and Research Committee Report to Senate (cont'd)

2. Complement Renewal Strategy: Provostial Discussion Paper

This past fall the Provost launched an initiative to develop a multi-year Complement Renewal Strategy for the University, with the goal of clarifying how best the University can build the complement needed to achieve academic priorities expressed in the University Academic Plan and the Strategic Research Plan. 160 searches were authorized for the 2018-2019 academic year, which the Provost has said is the first step in a longer-term strategy. The purpose of the Complement Renewal Strategy will be to set out high level principles and goals for the complement that York seeks to build over time, taking into consideration the challenges that post-secondary education faces and other urgent pressures including the need to support faculty members with necessary infrastructure and technology. The Complement Renewal Strategy will serve to guide and inform the allocation of resources through the annual complement planning and budget processes in the Faculties and the Office of the Provost.

An earlier draft of the Provostial Discussion Paper was shared with APPRC in March. Members provided reflections on the paper, offering input on its content and the form of the community consultation process. The input of Senators on this initiative is vital, particularly responses to the set of questions articulated in the document. To that end, the Committee will host a facilitated discussion of the Paper at this Senate meeting, commencing with a brief presentation by the Provost. At this time the Discussion Paper and the accompanying comparative analysis document have been made available only to members of the York Community. To ensure Senators have them for this meeting, they will be distributed in advance via the Senate list-serve.

3. Tracking 2015-2020 UAP Progress / Discussion with Academic Planners

Discussing Faculties' progress towards UAP goals is a focus for APPRC this spring and again in the autumn. Individual meetings with the Deans in *Education, Engineering, Environmental Studies, Health, Schulich* and the *Libraries* are taking place in April and May, with the Deans / Co-Principals of *Science, Glendon, Liberal Arts & Professional Studies, Arts, Media, Performance & Design, Osgoode* and *Graduate Studies* visiting in early Fall. The conversations will centre on the following questions:

1. **What are the local challenges you and your colleagues face, and what strategies are being taken in response?** Of particular interest are areas such as innovative academic program plans, collaborating with other Faculties on interdisciplinary programming; solidifying enrolments (including planned international targets) / retention; research intensification; enhancing experiential education and student success, and performance on SMA-2 metrics. It would be particularly helpful if ties between defined strategies and UAP priorities are articulated.
2. Are there one or two **measures, process or policy changes at the university-level that would fundamentally improve local planning** efforts and / or the ability to be nimble and act swiftly to respond to current challenges?

Academic Policy, Planning and Research Committee Report to Senate (cont'd)

3. Noting that we are in the penultimate year of the 2015-2020 UAP, what **observations do you have about the existing UAP priorities**: do they remain timely and apt academic goals aligned with our circumstances? Do any of them need to be refreshed or moved forward? Are new ones needed? And do you have reflections that may help with the implementation of the priorities in the next iteration of the Plan?

The Committee will report to Senate following the conclusion of the suite of spring meetings.

4. “Faculty Blue” Facilitating Group

The Committee last advised Senate that members of the Faculty of Environmental Studies and the Department of Geography were holding a retreat in late February, the focus of which was to develop the vision for the new Faculty, the broad disciplinary themes, planned degrees and programs to be housed in the Faculty, and the selection of a name for the new unit. Aided by a comprehensive collection of background information and data, the retreat was held and reportedly yielded concrete outcomes.

The Faculty Co-Coordinator, Professors Tarmo Remmel and Liette Gilbert, presented to the Facilitating Group in mid-March the plans that emerged from the retreat. The Facilitating Group (consisting of the Provost, the Vice-Provost Academic, the Deans of FES and LA&PS, the Chair of Geography, the Chair of ASCP and myself) provided feedback on the framework presented. It offered guidance and recommendations aimed at supporting the goals of the initiative to create a new Faculty with innovative and novel programming that attracts students, and consolidates and projects York’s strengths in the disciplines of environmental / urban / geography.

Developing the proposal for the establishment of the Faculty is the next major step in the process. It remains the plan to have a proposal ready for Senate review and approval in June.

5. Revisions to the Principles and Procedures Governing Non-Degree Studies

The Committee apprised Senate in January that it was reviewing revisions to the *Principles and Procedures Governing Non-Degree Studies*, a task that is one of APPRCs priorities for this year. The goal of the exercise is to update the governance framework for non-degree studies to reflect the transition to the School of Continuing Studies in 2014, bring needed clarity about the approval processes and the oversight of non-degree activities at the University. That review exercise has been continuing with the Provost. Through APPRC, reflections on the proposed revisions to the Principles and Procedures are going to be sought from Faculty Councils. Once finalized – anticipated this spring - APPRC and ASCP will jointly bring proposed revisions to the governing framework to Senate for approval.

Lesley Jacobs, Chair of APPRC



Report to Senate

At its meeting of 28 March 2019

For Action

All proposed new and revised programs are effective FW 2019-2020 unless otherwise noted.

1. Establishment of the Degree of Master of Management in Artificial Intelligence • Schulich School of Business • Faculty of Graduate Studies

At the Senate meeting of 28 February 2019, ASCP provided notice of its intention to propose the establishment of a new Master of Management in Artificial Intelligence degree. Accordingly, ASCP recommends,

That Senate approve the establishment of the degree of Master of Management in Artificial Intelligence.

Rationale

The full proposal and supporting documentation is included in Appendix A. The proposed Master of Management in Artificial Intelligence (MMAI) is a professional Master's degree to be housed in the Schulich School of Business. It is designed primarily for students with non-business undergraduate degrees seeking to obtain the skills and knowledge necessary to obtain employment in artificial intelligence (AI) management positions in private, public and non-profit organizations. An impetus for the establishment of this degree is the province of Ontario's goal of producing 1000 graduates annually over five years in the field of AI, with efforts coordinated by the Vector Institute.

The program is distinct from the MBA and other masters' degree programs in management offered by Schulich through its combined focus on the development of management skills and the provision of training in AI-related technologies. The limited offerings of similar programs in Ontario together with the growing number of employment positions in the field, indicate that this new program is expected to fill the gap in post-graduate AI management expertise and provide a career-pathway for its graduates.

Unique program learning outcomes have been articulated for the new degree program in consultation with the Vector Institute's 1000 AIMs guidelines. Most of the curriculum is new and has been designed specifically to support the achievement of the learning outcomes. In alignment with the UAP goal to expand experiential education

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

opportunities, a key component of the program is a capstone community-involved experiential learning project, the AI Consulting Project, where students will solve a business problem by applying pertinent management techniques and AI approaches. The majority of the project will take place on campus, in the new Schulich Deloitte Cognitive Analytics and Visualization Lab, with a portion taking place at the client site.

The breadth of tenured and contract faculty expertise at Schulich in the Operations Management and Information Systems area, which will be enhanced by three additional tenure-stream faculty members to be hired over the next three years, and the expertise of the Department of Philosophy, which will deliver the core Ethics of AI course, means Schulich is well positioned to deliver a high quality program. The external appraisers endorsed the program and their recommendations for enhancements were made by the proponents.

Decanal statements from the Lassonde School of Engineering and the Faculty of Science confirm consultation on and support for the proposed degree. Statements from the anchor Dean and Provost confirm the resources for the new program.

Approvals: FGS 7 February 2019 • ASCP 13 February 2019 • APPRC 14 February 2019

2. Establishment of the Master of Management in Artificial Intelligence degree program • Schulich School of Business • Faculty of Graduate Studies

ASCP recommends,

That Senate approve the establishment of a Master of Management in Artificial Intelligence degree program.

Rationale

See Item 1 above.

Consent Agenda

3. Changes to degree requirements and program learning outcomes for the Master of Business Analytics program • Schulich School of Business • Faculty of Graduate Studies

ASCP recommends,

That Senate approve changes to the degree requirements and program learning outcomes for the Master of Business Analytics program, housed within the Schulich School of Business, Faculty of Graduate Studies, effective Summer 2019.

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

Rationale

As part of Schulich's continuous improvement approach to curriculum and in view of the growing number of social and ethical challenges stemming from the increasing utilization of big data, the Master of Business Analytics (MBAN) proposes revisions to program learning outcomes to achieve two goals: 1) better highlight the program's focus on ethics and the societal implications of Artificial Intelligence and big data, and 2) establish a limited and more clearly articulated set of outcomes in a competency-based format that are specific and measurable and tightly aligned to the course-based assessment of student performance.

Related to the first goal, the program proposes the addition of a core course, PHIL 5340 Ethics and Societal Implications of Artificial Intelligence, which has been developed by the Department of Philosophy with students of Schulich and Lassonde in mind. This course, also to be required for the Master of Management in Artificial Intelligence, will provide an overview of social and ethical issues arising from emerging Artificial Intelligence technology, exploring both existing and future technology applications to enable students to learn to recognize and anticipate novel ethical challenges. Along with other core MBAN courses, the Ethics course will enable students to achieve the ethics-related program learning outcomes. The addition of this course reduces the number of elective credits from 9.0 to 6.0 but does not affect the total number of required credits for the program which will remain at 45.

These changes bring the program in line with the program accreditation standards set by the Vector Institute's 1000 AIMS initiative, noted above in relation to the Master of Management in Artificial Intelligence degree.

Approvals: FGS Council 7 March 2019 • ASCP 20 March 2019

4. Changes to requirements for the Graduate Diploma in Intermediate Accounting • Schulich School of Business • Faculty of Graduate Studies

ASCP recommends,

That Senate approve changes to the requirements for the Graduate Diploma in Intermediate Accounting, housed within the Schulich School of Business, Faculty of Graduate Studies, effective Summer 2019.

Rationale

The Graduate Diploma in Intermediate Accounting is a two-semester program designed to provide foundational knowledge for students with non-business undergraduate degrees who intend to pursue Schulich's Master of Accounting program. The two terms of the Diploma are designated Term 0 and Term 1, with Term 1 overlapping with the

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

first term of the Master's program, which has three terms designated as Term 1, Term 2 and Term 3. Because of the Term 1 overlap in the two programs, any change to Term 1 affects both the Diploma and Master's programs. In Terms 0 and 1, the objective is to ensure students master the same level of accounting content as graduates of Schulich's BBA or IBBA programs who enter the program in Term 2.

The three entry points to the Diploma and Master's program are as follows:

- Term 0 (Diploma entry): Applicants with non-CPA accredited undergraduate degrees
- Term 1 (Master's entry): Applicants with CPA accredited undergraduate degrees
- Term 2 (Master's advanced standing): Schulich IBBA & BBA (accounting specialization)

It is proposed to increase the number of required credits for the Diploma from 27 to 30 to accommodate the addition of one core course, OMIS 6710 Management Information Systems. The addition of this course as a requirement will enable Diploma students to obtain a strong foundation in current information systems, especially those relevant to accounting practice, ensure Diploma students who proceed into the Master's program have the same level of knowledge as students with CPA-accredited undergraduate degrees, such as graduates of Schulich's BBA and IBBA programs, and allow the Diploma to meet the accreditation requirements of CPA Ontario.

Approvals: FGS Council 7 March 2019 • ASCP 20 March 2019

5. Changes to degree requirements for the Master of Accounting program • Schulich School of Business • Faculty of Graduate Studies

ASCP recommends,

That Senate approve changes to the degree requirements for the Master of Accounting program, housed in the Schulich School of Business, Faculty of Graduate Studies, effective Summer 2019.

Rationale

As noted in Item 4, the Graduate Diploma in Intermediate Accounting and the Master of Accounting program are closely linked. It is proposed to increase the number of credits for the Master of Accounting from 42 to 45 as a result of adding a core course, ACTG 6250 Financial Reporting and Analysis. This course is currently offered in the Diploma program, but it is proposed that it be shifted from Term 0 to Term 1 as the program believes that students will be better equipped to understand the content following the completion of Term 0. This change formalizes current practice, as the majority of students who enter the Master's program in Term 1 are required to take this course as

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

overload due to a deficit in content in their undergraduate business degrees. Those Master's students who must take the course can only do so in Term 0, the only time it is offered, which requires that they extend their program by one term. In view of this, shifting the course to Term 1 will provide a clear benefit to students.

Approvals: FGS Council 7 March 2019 • ASCP 20 March 2019

6. Changes to degree requirements and program learning outcomes for the MA program in Economics • Department of Economics • Faculty of Liberal Arts & Professional Studies • Faculty of Graduate Studies

ASCP recommends,

That Senate approve changes to degree requirements and program learning outcomes for the MA program in Economics, housed in the Department of Economics, Faculty of Liberal Arts & Professional Studies, Faculty of Graduate Studies.

Rationale

The change proposed is the removal of the requirement that students in the MA program in Economics complete two 3-credit courses which include a research paper that constitutes at least 50% of the course grade. In discussions within the program, questions surfaced about the extent to which the requirement was meeting the objective of improving students' writing skills and about the importance of essay writing skills, as most writing in the discipline takes the form of analysis of data and regression results and short executive summary reports. The administrative challenges associated with implementing the requirement also emerged in those discussions. Student feedback has indicated that the writing requirement restricts their flexibility in course selection, as currently five of the eight courses in the program are dedicated to meeting core requirements and the writing requirements. In view of the fact that a number of courses in the Economics program currently include various forms of written work as evaluated components of the course, the learning outcome of writing skills is being met in other ways.

To reflect the change to the degree requirements, the program learning outcomes have been updated to emphasize writing skills relating to the preparation of reports, data analysis and executive summaries, rather than essay writing skills.

Approvals: FGS Council 7 February 2019 • ASCP 20 March 2019

7. Changes to the requirements for Certificate in Anti-Racist Research and Practice • Department of Equity Studies • Faculty of Liberal Arts & Professional Studies

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

ASCP recommends,

That Senate approve changes to the requirements for the Certificate in Anti-Racist Research and Practice, housed in the Department of Equity Studies, Faculty of Liberal Arts & Professional Studies.

Rationale

The changes proposed for the Certificate in Anti-Racist Research and Practice include the reduction of the number of required credits from 30 to 24, the reduction in the number of options to fulfil the core requirements and the removal of a number of courses from the list of electives. Responding to the Department's most recent cyclical program review, the removal of a number of cross-listed courses enhances the coherence of the certificate's focus on race and racism and reduces reliance on other units' courses. The reduction in the number of required credits brings the Certificate in line with similar curricular options in LA&PS and more clearly marks it as a standard certificate option to students.

In terms of core requirements, students will be required to take one of two six-credit courses with a race-based focus (HREQ 3680 Racism in Canada or INDG 2013 / HREQ 2060 Racism and Colonialism) and one six-credit course in Research Methods, ensuring students have a firm foundation in race and racism. The remaining twelve credits are to be selected from a list of approximately a dozen courses, whereas previously an extended list of Equity Studies and cross-listed courses were offered.

Approvals: LA&PS Faculty Council 10 January 2019 • ASCP 6 March 2019

8. Changes to the requirements for the Certificate in Indigenous Studies • Department of Equity Studies • Faculty of Liberal Arts & Professional Studies

ASCP recommends,

That Senate approve changes to the requirements for the Certificate in Indigenous Studies, housed in the Department of Equity Studies, Faculty of Liberal Arts & Professional Studies.

Rationale

The changes proposed update course information for the Certificate in Indigenous Studies to reflect changes to curricular offerings. Previously, courses from a number of different programs could be taken to fulfill certificate requirements but, as the list had not been brought up-to-date in some time, it included courses that no longer exist while courses in the Indigenous Studies program were absent. The updated list of electives now reflects the offerings of the standalone Indigenous Studies program and other

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

Indigenous Studies courses across the University. At the suggestion of ASCP, the calendar copy also includes a statement that, in view of the ongoing indigenization of curriculum throughout the University, courses from other programs may be added to the list of non-core options in the future and course substitutions may be permitted in consultation with the Department of Equity Studies.

The result of these changes is a certificate program with enhanced coherence that at the same time offers flexibility to students to take a wide breadth of choices in Indigenous Studies to fulfill certificate requirements.

Approvals: LA&PS Faculty Council 10 January 2019 • ASCP 6 March 2019

9. Establishment of Consecutive Option for the Black Canadian Studies Certificate • Department of Humanities • Faculty of Liberal Arts & Professional Studies

ASCP recommends,

That Senate approve the establishment of a Consecutive option for the Black Canadian Studies Certificate, housed in the Department of Humanities, Faculty of Liberal Arts & Professional Studies.

Rationale

It is proposed to establish a Consecutive option for the Black Canadian Studies Certificate, which is currently available only as a Concurrent option for students enrolled in an undergraduate degree program at York. The Consecutive option will allow students who have already completed a degree, whether at York or another accredited institution, to pursue the certificate as a standalone program, in response to requests from professionals and community members. Students who wish to enroll in the Consecutive option will be required to complete the prerequisite course, HUMA 1300 The Cultures of Resistance in the Americas, before applying to the certificate program. The program's degree and admission requirements have been updated to reflect the establishment of the Consecutive option.

A minor change also is proposed to the program's calendar as a core course for the certificate is cross-listed between the Multicultural and Indigenous Studies (MIST) program and the School of Public Policy and Administration (PPAS), MIST 4052 / PPAS 4052 Race, Ethnicity and Social Policy. As a result of the closure of the MIST program, approved by Senate at the February 2018 meeting, this and any other references to the program have been removed from the calendar. The Race, Ethnicity and Social Policy course will remain a requirement of the certificate as it will continue to be offered by PPAS.

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

Approvals: LA&PS Faculty Council 14 February 2019 • ASCP 20 March 2019

10. Transfer Credits from the School of Dance to the BFA (Honours) program in Dance • School of the Arts, Media, Performance and Design

ASCP recommends,

That Senate approve granting a maximum of 60 block transfer credits to eligible graduates of the School of Dance Contemporary Dance Diploma Programme towards the Honours BFA programs in Dance within the School of the Arts, Media, Performance & Design.

Rationale

The Senate Transfer Credit Policy enables granting transfer credit from accredited and approved post-secondary institutions towards degrees at York. The legislation also allows for transfer credit from non-accredited institutions to be awarded on a case by case basis.

AMPD proposes that York recognize the courses of The School of Dance Contemporary Dance Diploma Programme for credit at York. AMPD has long established partnerships with professional training schools, including the National Ballet School, Sampradaya Dance Academy, the School of Toronto Dance Theatre, and Holland College. In the case of the Toronto School of Dance Theatre, graduates of the three-year Professional Training Program at the School are eligible to receive 60 transfer credits towards an advanced placement in an Honours BFA degree at York. The proposed transfer credit arrangement with The School of Dance is a comparable initiative.

Extensive consultation has taken place between the Department of Dance and the School of Dance over the past two years. The School of Dance's alignment with the objectives and standards of the Department of Dance's Honours BFA programs was evidenced during a site visit by the Department Chair.

The proposed formal pathway between the School of Dance and York will allow academically motivated students the opportunity to complete their professional training and then apply to transfer to York's academic program immediately or after pursuing a performance career. It is expected that one or two students per year would apply for admission and transfer credit. The transcripts of interested students who graduated from The School of Dance prior to the establishment of the transfer credit arrangement will be evaluated for transfer credits on a case-by-case basis.

The arrangement with the School of Dance will enable students, upon completion of the three-year Contemporary Dance Diploma and an evaluation at York, to be placed at year three of the Honours BFA program in Dance. Building on their training at The

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

School of Dance, focused on dance technique and performance, their courses at York will primarily be theoretical, resulting in a similar balance of studio and studies courses as a student enrolled from year 1 in the BFA Honours program in Dance. The 60 credits transferred from The School of Dance would be bound credit, specific to completion of the requirements for the Honours BFA in Dance. Students who do not maintain Honours standing may be considered for transfer to the BA program in Dance.

A Transfer Articulation Agreement will be developed between The School of Dance and York University upon Senate approval of the transfer credit proposal.

Approvals: Executive Committee of AMPD Faculty Council on behalf of AMPD Faculty Council 13 February 2019 • ASCP 6 March 2019

11. Establishment of a stream in Financial Mathematics within the Specialized Honours BA and BSc programs in Applied Mathematics • Department of Mathematics and Statistics • Faculty of Science

ASCP recommends,

That Senate approve the establishment of a stream in Financial Mathematics within the Specialized Honours BA and BSc programs in Applied Mathematics, housed within the Department of Mathematics and Statistics, Faculty of Science.

Rationale

As recommended by the 2015 Cyclical Program Review of the Computational Mathematics program, it is proposed that the program be closed, addressed in Item 12. However, in view of the potential for growth of the existing Financial Mathematics concentration within the Computational Mathematics program, it is proposed that the concentration be converted to a stream within the Specialized Honours BA and BSc programs in Applied Mathematics. This stream will provide students with preparation for entry-level positions in the finance industry performing quantitative analysis or for further studies at the Master's level.

Currently, students in the Computational Mathematics program who take the Financial Mathematics concentration must take a total of 83 credits, which is higher than most other Specialized Honours programs in the Department of Mathematics and Statistics. In view of this, the number of required credits for students who take the Financial Mathematics stream in the Applied Mathematics program has been reduced to 69. To achieve this, a thorough review of the current requirements of the concentration was completed with a view to streamlining the relationship between courses and program learning outcomes. As a result, several of the current requirements of the concentration have been removed from the stream, such as Economics courses which may be

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

beneficial but not essential to students aspiring to a career in quantitative finance, and a new core course has been added, MATH 3282 Financial Mathematics.

Approvals: Science Faculty Council 13 November 2019 • ASCP 20 March 2019

12. Closure of the BSc programs in Computational Mathematics • Department of Mathematics and Statistics • Faculty of Science

ASCP recommends,

That Senate approve the closure of the Specialized Honours BSc program in Computational Mathematics, housed within the Department of Mathematics and Statistics, Faculty of Science.

Rationale

Computational Mathematics, a stand-alone program housed within the Applied Mathematics program, is offered as a Specialized Honours BSc program. In view of the program's low enrolments, with about three or four students in each year of the program, its 2015 Cyclical Program Review and the University's Academic and Administrative Program Review exercise recommended its closure. The Computational Mathematics and Applied Mathematics programs closely resemble one another as the research interests of Applied Mathematics faculty members have evolved over time to have a similar focus to that of Computational Mathematics. Two concentrations exist within Computational Mathematics – Applied and Industrial Mathematics and Financial Mathematics – and a companion proposal was submitted to move the Financial Mathematics concentration to the Applied Mathematics program as a stream (see Item 11).

Students currently enrolled in the program will be given the option of being grandparented into the existing program requirements or switching to the Specialized Honours BSc program in Applied Mathematics. In the event that problems with course selections arise as a result of the closure, the UPD or Section Director may permit students to fulfill program requirements with suitable substitutions.

There will be no impact on faculty members as Applied Mathematics faculty currently administer the Computation Mathematics program and will continue to teach courses of a similar nature in Applied Mathematics.

Approvals: Science Faculty Council 13 November 2019 • ASCP 20 March 2019

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

For Information

a. Minor Modifications to Curriculum

Minor changes to degree or admissions requirements were approved for the following programs:

Education

- Minor change to degree requirements for the BA programs in Educational Studies

Health

- Minor changes to streams within the Specialized Honours BA and BSc programs in Global Health
- Minor changes to degree requirements for the Bachelor of Health Studies
- Minor changes to the requirements for the Interdisciplinary Certificate in Aging
- Minor changes to admission and program requirements for the York-Seneca Rehabilitation Services Certificate

Graduate Studies

- Minor change to the degree requirements for the MA program in Interdisciplinary Studies
- Change in rubrics for the Professional LLM specializations in Osgoode Professional Development
- Changes to the admission requirements in English Language Proficiency

Liberal Arts & Professional Studies

- Minor change to degree requirements for the BA programs in Children, Childhood and Youth
- Minor change to the Bachelor of Human Resources Management Minor program
- Minor changes to requirements for the Professional Certificate in Logistics

Lassonde

- New rubric for technology proficiency courses

Science

- Expansion of the Seneca-York Chemistry Co-Registration Option to the BSc program in Chemistry and the BSc (Honours) program in Biochemistry
- Minor change to degree requirements for the BA and BSc programs in Applied Mathematics
- Minor change to the Biomedical Science stream within the BSc programs in Biology

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

- Change to non-science general education requirement for BSc programs

b. Academic Integrity at York University

In March 2017, the Office of the Vice-Provost Academic, in collaboration with the AVP Teaching & Learning, convened a small working group to survey the landscape of academic integrity at York and beyond in view of the changing context in higher education as a result of technological advances and increased emphasis on collaborative learning and experiential education. The Working Group on Academic Integrity was comprised of Co-Chairs Amy Gaukel, Lassonde, and Mike Zryd, AMPD, and Tom Scott, Libraries, and Karthiga Sandrasri, AVP Teaching & Learning Office. The Working Group was tasked with examining the *Senate Policy on Academic Honesty* (the Policy) and tools and procedures being utilized, and considering proactive preventative measures that could be implemented. To that end, the Working Group explored recent literature, participated in meetings of professional organizations and consulted with colleagues at York to deepen understanding of the current context and to identify challenges and issues.

The Working Group's activities culminated in a number of observations and recommendations about academic integrity at York. Included among them were:

- the lack of sufficient or reliable data about the scope of academic honesty offences
- the prevalence of informal resolution of offences and the underreporting of offences, due in part to the perceived onerousness of administering the Policy
- cross-Faculty administrative challenges due to unit- or Faculty-specific processes that limit communication between Faculties and result in different approaches to the Policy in different units
- the need for increased awareness of the connection between pedagogical assessment practices and academic integrity, as practices like recycling assignments and using textbook test banks for exams amplify challenges with academic integrity
- the importance of distinguishing between fraud, comprising intentional violations of academic integrity such as contract cheating and manufacturing fraudulent academic records, and plagiarism, comprising activities ranging from intentional stealing of intellectual property to improper citation
- the view of community members that academic integrity is not a visible part of the York culture

The Working Group recommends that the University take a multi-faceted harm reduction approach to build a culture of academic integrity at York. Specific

Academic Standards, Curriculum and Pedagogy Committee

Report to Senate (cont'd)

recommendations include the undertaking of a comprehensive review of the Policy and initiatives to promote education about academic integrity to various stakeholders across campus.

In response to the Working Group's recommendations, the following steps will be taken:

- An ad hoc working group will be established to oversee revisions to the *Senate Policy on Academic Honesty*, with representation from ASCP, the Senate Appeals Committee, the University Secretariat, and Faculty representatives, possibly from among Associate Deans Students.
- A second working group will be established under the Office of the Vice-Provost Academic with a mandate to address educational and institutional supports/resources related to academic integrity for faculty, staff and students. The working group will include broad representation from the Office of the Vice-Provost Academic, the University Secretariat, the Teaching Commons, Libraries, Student Services/Registrar's Office, Office of Student Code of Rights & Responsibilities, Graduate Studies, York International and others.

Efforts are currently underway in the Secretariat to review the Policy with a view to bringing forward a draft revision to the policy review working group.

It is noted that academic integrity has historically had a broader meaning in the York context, as indicated in the *Senate Policy on the Implications of Disruptions or Cessations of University Business Due to Labour Disputes or Other Causes*, where academic integrity denotes quality and completeness of academic programs. However, academic integrity is the term used by the rest of the Ontario university sector, and consideration will need to be given to the implications of using that term in the York context going forward.

Kim Michasiw, Chair



Senate Committee on Awards

Report to Senate

At its meeting of 28 March 2019

FOR INFORMATION

1. 2017-2018 Undergraduate Award Disbursement Report

The Senate Committee on Awards received the annual report on the disbursement of student awards for the previous fiscal year from Student Financial Services (SFS). The full report is provided as Appendix A.

Table A in the report provides statistical data on the disbursement of undergraduate student awards in the 2017-2018 fiscal year (May 1, 2017 to April 30, 2018), with comparative data for 2016-2017 and 2015-2016.

In their presentation to the Committee, SFS representatives highlighted the following:

- Compared to 2016-2017, the overall amount of award and bursary funding decreased 6.4% to \$29.1M while the number of recipients increased 10.1% to 29,838. The overall year-over-year average of award value per student decreased by \$172 to \$976.
- A major reason for the overall decrease in funding relates to the York Funded Entering Student Awards which decreased 11.9% to \$9.6M. This is largely attributed to the reduction in the values of the York University Automatic Entrance scholarship in 2017-2018 by \$500 for high school students entering with a final average in the range of 80% to 94.9%.
- Compared to 2016-2017, the disbursement of York Funded Continuing Student Awards decreased 3.5% to \$11M while the number of recipients increased 8.3% to 12,206. The decrease in expenditures under the York University Undergraduate Bursary program is a major source of the reduction in spending, as it was decided to defer \$500K of bursary funds to the 2018-2019 year to support students experiencing financial hardship as a result of the 2018 labour disruption. The expenses for this special bursary program will be shown in the 2018-2019 disbursement report.
- Spending on Government Funded Awards decreased 18.9% to \$1.46M as a result of decreased disbursements for the Ontario Bridging Participant Assistance Program (OBPAP) and the Internationally Educated Professionals (IEP) Bridging Program Tuition Waiver. Government funding varies year-to-year

Senate Committee on Awards

Report to Senate (cont'd)

depending on funding directives of the provincial government and on the applicant pool.

- York has been able to increase awards from endowments and donations every year and it is hoped that the University will see enhanced growth going forward. Last year disbursements increased 1.3% over 2016-2017 for a total of \$7.09M.
- In looking at the breakdown by Faculty, the professional Faculties (i.e., Osgoode, Lassonde and Schulich) have higher percentages of students receiving awards due in large part to the higher tuition. OSAP has caps on tuition, and the Student Access Guarantee (SAG) requires the University to provide additional funding to students with financial need whose direct educational costs (tuition, books and mandatory course fees) have not been met through OSAP.
- The provincial government changes announced in January 2019 relating to eligibility for OSAP grants are anticipated to limit the available funding for York Funded awards in 2019-2020 and beyond.

2. 2017-2018 Graduate Award Disbursement Report

The Senate Committee on Awards received the annual report from the Faculty of Graduate Studies on Graduate Awards for 2017-2018, with comparative data for the previous six years. The full report is attached as Appendix B.

In presenting the Report to the Committee, Dean Loebel explained the quota allocation system used by the Tri-Councils for Master's and doctoral scholarships. The quota for CIHR, NSERC and SSHRC scholarships for Master's students (Canada Graduate Scholarships – Master's) is linked to an institution's proportion of the total sum of grant and award funding received by both faculty and students at all institutions. A quota system also is used for NSERC and SSHRC doctoral scholarships, with those scholarships linked to the success of York doctoral students over the preceding years.

Other highlights from the Committee's discussion with Dean Loebel include:

- York's quota for NSERC doctoral grants has grown in recent years as a result of a high success rate for applications of approximately 70%, compared to the national average of 40%.
- Most graduate awards are for domestic students with a few exceptions, including the Vanier Canada Graduate Scholarship and the Ontario Trillium Scholarship. It was noted that the Ontario Trillium Scholarship currently is under review by the provincial government and funds have not been committed for the 2019-2020 year.

Senate Committee on Awards

Report to Senate (cont'd)

- The future of the Ontario Graduate Scholarship is uncertain in view of the current provincial government's focus on deficit reduction initiatives.

The committee particularly wishes Senate to note that the number of applications York is allowed to submit for SSHRC, NSERC, and CGS-Master's awards is dependent on faculty success in obtaining research funding. Faculty are reminded of the importance of Tri-Council funding to the availability of funding for graduate students. The data is not disaggregated so that it is not currently possible to know how fine a match there is between Faculty grants and student funding, but it is clear that faculty success in Tri-Council research grants helps graduate student success.

Brenda Spotton Visano, Chair

The Senate of York University – Minutes

Meeting: Thursday, February 28, 2019, 3:00 pm
 Dr Robert Everett Senate Chamber, N940 Ross Building

| | | |
|---------------------------------|--------------------|-------------------|
| F. van Breugel (Chair) | R. Grinspun | S. Paradis |
| D. Mutimer (Interim Vice-Chair) | S. Gururani | J. Patel |
| M. Armstrong (Secretary) | R. Habib | A. Perry |
| T. Abdullah | R. Haché | L. Phillips |
| H. Ali-Hassan | M. Hamadeh | B. Pilkington |
| R. Allison | D. Hastie | S. Pisana |
| G. Audette | L. Hébert | M. Poon |
| T. Baumgartner | A. Hovorka | C. Popovic |
| A. Belcastro | R. Irving | M. Rajabi Paak |
| L. Bellissimo | L. Jacobs | A. Redding |
| O. Birot | A. Karim | I. Roberge |
| D. Cabianca | R. Kenedy | B. Ryder |
| R. Cheung | A. Khalil | L. Sanders |
| D. Clancy | R. Koleszar-Green | V. Saridakis |
| J. Clark | K. Kroker | M. Schweitzer |
| M. Cobblah | B. Lawrence | L. Sergio |
| M. Condon | J. Lazenby | J. Sharma |
| A. Czekanski | R. Lenton | S. Siddiqui |
| J. D'Angelo | T. Loebel | A. Solis |
| A. Davis | J. MacDonnell | B. Spotton Visano |
| K. Davis | W. Mackwood | P. Szeptycki |
| W. Denton | J. Magee | K. Thomson |
| R. Desai-Trilokekar | J. Mayberry | G. Tourlakis |
| Y. Dina | C. McAulay | P. Tsaparis |
| D. Doorey | P. McDonald | R. Tsushima |
| H. Edgell | J. McMurtry | E. van Rensburg |
| C. Ehrlich | K. Michasiw | G. Vanstone |
| S. Ehrlich | J. Michaud | R. Wellen |
| B. Evans | M. Morrow | B. White |
| I. Ferrara | R. Myers | D. Wilson |
| N. Fisher-Stitt | L. Nasr El Hag Ali | L. Wood |
| L. Frew | P. Nguyen | J. Wu |
| A. Garisto | A. Norwood | J. Yeomans |
| G. Georgopoulos | J. O' Hagan | A. Zalik |
| J. Goldberg | | G. Zwick |

1. Chair's Remarks

The Chair of Senate, Professor Franck van Breugel, welcomed Senators and began the meeting by presenting a video which explains the statements included in the Indigenous land acknowledgement, the history of the traditional territory of the Indigenous Peoples who called the Keele and Glendon campus lands home before the arrival of the settlers, and the *Dish With One Spoon Wampum Belt Covenant* that covers the area. Jointly produced by the Centre for Aboriginal Student Services at York University, Professor

The Senate of York University – Minutes

Deborah McGregor, Professor Ruth Koleszar-Green, and Amy Desjarlais, traditional knowledge keeper, the [video is available online](#).

2. Business Arising from the Minutes

There was no business arising from the minutes.

3. Inquiries and Communications

a. Academic Colleague to the Council of Ontario Universities

The Academic Colleague to the Council of Ontario Universities, Professor Andrea Davis, reported that the focus of the Academic Colleagues' most recent meeting was on the new government-mandated changes relating to OSAP, tuition, and ancillary fees. In particular, the Colleagues noted the implementation challenges associated with the Student Choice Initiative and the impact of OSAP changes on mature and graduate students. Also discussed were ideas for collaborative initiatives to mitigate the sense of distrust in the relationship between Ontario universities and the provincial government, including seeking new allies to help change the narrative about universities to the public.

4. President's Items

President Rhonda Lenton provided an update on the Student Choice Initiative (SCI), announced by the provincial government in January, which will introduce a requirement that some student fees be made optional. The Ministry of Training, Colleges and Universities (MTCU) has informed post-secondary institutions that ancillary fees that fund academic supports, student health and wellness and student safety will be considered mandatory. Other fees will be considered optional and universities will be required to set up an online platform where students can opt out of those fees. A number of questions remain about the interpretation of the mandatory and optional categories, which may be clarified in technical briefings held by MTCU.

President Lenton highlighted the importance of a consultative, student-driven discussion and robust process to implement the Student Choice Initiative in order to reach an outcome that achieves full transparency about the fees levied. Three sub-committees will be established to handle the different components of implementation, which will include representation from YFS, YUGSA and the Glendon College Students Association (GCSA). Consultation also will be undertaken with the broader York community.

Following the conclusion of the pan-university budget consultation, President Lenton reported on the plans to take up the themes that emerged from the consultation which were depicted in a word cloud displayed on the screen for Senators. In view of its impact on every University Academic Plan (UAP) priority, deferred maintenance

The Senate of York University – Minutes

surfaced as a high priority for investment. Other themes that emerged as priorities include interdisciplinary scholarship, teaching and learning and the faculty complement. The administration will begin to consider ways of addressing the priority issues, such as creating targeted strategic funds or increasing the annual budget for deferred maintenance. President Lenton conveyed the administration's intention to hold a budget consultation on an annual basis.

President Lenton shared a number of updates relating to the Statement of Policy on Free Speech, approved by both Senate and the Board in December 2018, including:

- reports that the Higher Education Quality Council of Ontario (HEQCO) has been asked by the provincial government to assess post-secondary institutions' free speech policies to confirm their compliance with the government directive
- the plans to develop interpretive guidelines for the Statement, in follow-up to the additional activities and consultations recommended by the Free Speech Policy Working Group, which will be led by a working group with student group representation
- the status of the reviews of the Student Code of Rights & Responsibilities, with the revised Code to be implemented for the FW 2019-2020 academic year, and the Ombuds Office role, in response to a request from a group of Senators and in follow-up to the recommendations of the Working Group

Other comments made by President Lenton include the following:

- confirmation of the University's commitment to move ahead with a presence in Markham which is likely to be smaller in scope than originally planned
- appreciation for the contributions of two colleagues who will be departing from the University in the coming months, Vice-President Research & Innovation Robert Haché, who has been appointed to the position of President and Vice-Chancellor of Laurentian University, and University Secretary and General Counsel Maureen Armstrong, who is retiring
- encouragement for Senators to review the Kudos Report, which features two Senators, Professor Lisa Farley, Education, who received a SSHRC Insight Grant, and Professor John Moores, Lassonde, who received funding from the Canadian Space Agency's Flights and Field for the Advancement of Science and Technology program

Responding to concerns about the impact of the SCI on the operations of student groups, President Lenton confirmed that decisions about the categorization of services will not be made without the input of student groups. In view of the tight implementation timeline of FW 2019-2020, it was reported that the Office of the Vice-Provost Students

The Senate of York University – Minutes

has initiated meetings and email communications with YUGSA, the Student Representative Roundtable and other student groups regarding the classification of their funding within the government's mandatory and optional categories. The positioning of YUGSA within the Faculty of Graduate Studies structure and the many essential services it administers were highlighted.

Senators shared a range of views and asked questions about the President's remarks. Included among them were:

- the view that university budgets are shifting away from investing in research and teaching to prioritizing investment in the administration and that detailed data about spending trends should be provided to the community
- a request for more detailed information about the costs associated with moving forward with Markham Centre Campus in the absence of provincial government funding
- the view that Senate approval should be sought on the outcomes of the reviews of the Student Code of Rights & Responsibilities and the Ombuds Office role as those items relate to academic matters

Responding to Senators' comments, President Lenton confirmed that the investment of every dollar possible in students, staff, and teaching and learning – the core academic activities of the university – is the guiding principle of the administration. Under the leadership of Vice-President Finance and Administration McAulay, York is involved in a benchmarking exercise on administrative services to understand the University's spending in relation to other universities; President Lenton suggested the idea of holding a community event to share the findings of the exercise. President Lenton committed to provide more details about funding for Markham at an upcoming meeting.

Regarding the reviews of the Student Code and the Ombuds role, President Lenton indicated that any recommendations that emerge from the reviews that are under Senate's purview will come forward to Senate.

Committee Reports

5. Executive Committee

- a. Proposal for a Special Joint Senate-Board Working Group on Jurisdiction related to Cancellation / Suspension of Classes during a Labour Disruption

It was moved and seconded **“that Senate approve without amendment the establishment of a Special Joint Senate-Board Working Group on Jurisdiction Related to the Cancellation / Suspension of Classes during a Labour Disruption.”**

The Senate of York University – Minutes

The Interim Vice-Chair, Professor David Mutimer, introduced the proposal for the Special Joint Senate-Board Working Group, which was being brought forward for Senate's approval following the discussion of the draft proposal at the January meeting. The proposal was updated to reflect the feedback generated by Senators in that discussion, in particular, the incorporation of the recommendation to have one of the three Senate seats designated for a student Senator. The proposal was endorsed by the Board Executive Committee and approved by the Board of Governors earlier in the week, contingent on Senate's approval of the document.

Senators shared a number of comments about the proposal to establish the Working Group, centering on the view that Senate has legislative authority under the York Act for academic policy, which captures the cancellation / suspension of classes. Responding to Senators' comments, Provost Philipps highlighted that the objective of the Working Group is to bring Senate and the Board together to consider and clarify the question of jurisdiction relating to the cancellation / suspension of classes during a labour disruption.

Following discussion, the Chair *called the question*. On a vote, the motion was *carried*.

b. Election of Members of Non-Designated Senate Committees

The Vice-Chair presented a candidate for election to ASCP and confirmed that no other nominations had been received. It was moved, seconded and *carried* **“that nominations be closed.”** As a result, Professor Logan Donaldson, Science, was acclaimed as a member of ASCP.

c. Information Items

The Executive Committee's information items included the following:

- the Committee's monitoring of the academic disruption, including the status of FW 2017-2018 remediation and provisional grades
- its approval of recommendations from the Sub-Committee on Honorary Degrees and Ceremonials to add individuals to the pool of prospective recipients of honorary degrees

6. Academic Policy, Planning and Research

a. Information Items

APPRC provided information on these items:

The Senate of York University – Minutes

- its tracking of 2015-2020 UAP progress and preparations for one-on-one discussions with the Deans / Co-Principals over spring and fall 2019 on their respective successes in advancing UAP goals
- the status of the development of a complement renewal strategy, with a forthcoming opportunity for collegial consultations to be guided by a Provostial Discussion Paper on the topic
- reflections on the ASCP-APPRC Forum of Ideas held on February 7, which focused on program re-visioning and curriculum reform and interdisciplinary / cross-Faculty program development, with further work on the latter area to be taken up under the guidance of the Provost
- the efforts of the Faculty Blue Facilitating Group, which continues to work closely with Geography, the Faculty of Environmental Studies and other relevant parties, to be guided by a Plan of Action for this term
- the work underway on the VPRI-led initiative to develop and implement an Electronic CV (ECV) tool for York Faculty members

7. Academic Standards, Curriculum and Pedagogy

- a. Establishment of a Master of Management in Artificial Intelligence Degree Type and Program (Notice of Motion), Schulich School of Business, Faculty of Graduate Studies

ASCP gave notice of its intention to make the following recommendation in a statutory motion: “that Senate approve the establishment of the degree of Master of Management in Artificial Intelligence.”

In response to a comment about the proliferation of degree types, it was noted that it is common practice for business schools to have distinct degree types and that the curriculum for the Master of Management in Artificial Intelligence is distinct from that of other degrees in Schulich.

- b. Establishment of a Diploma in Law for Law Enforcement Professionals, Osgoode Hall Law School, Faculty of Graduate Studies

It was moved, seconded and *carried* “**that Senate approve the establishment of the Graduate Diploma in Law for Law Enforcement Professionals within Osgoode Professional Development, Osgoode Hall Law School, Faculty of Graduate Studies.**”

- c. Changes to the requirements for the Certificate in the Discipline of Teaching English as an International Language, Department of English, Glendon

The Senate of York University – Minutes

It was moved, seconded and *carried* “**that Senate approve changes to the requirements for the Certificate in the Discipline of Teaching English as an International Language, housed within the Department of English, Glendon.**”

- d. Changes to degree requirements and program learning outcomes for the BA programs in Human Rights and Equity Studies, Department of Equity Studies, Faculty of Liberal Arts & Professional Studies

It was moved, seconded and *carried* “**that Senate approve changes to degree requirements and program learning outcomes for the BA programs in Human Rights and Equity Studies, housed in the Department of Equity Studies, Faculty of Liberal Arts & Professional Studies.**”

- e. Establishment of a Graduate Field: Black Studies and Theories of Race and Racism within the MA and PhD Programs in Social and Political Thought, Department of Social Science, Faculty of Liberal Arts & Professional Studies, Faculty of Graduate Studies

It was moved, seconded and *carried* “**that Senate approve the establishment of a Graduate Field in Black Studies and Theories of Race and Racism within the MA and PhD programs in Social and Political Thought, housed in the Department of Social Science, Faculty of Liberal Arts & Professional Studies, Faculty of Graduate Studies.**”

- f. Information Items

ASCP provided information on the following minor changes to degree or admissions requirements approved by the Committee:

Liberal Arts & Professional Studies

- Minor change to degree requirements for the BA and BCom programs in Information Technology, School of Information Technology
- Minor change to degree requirements for the Honours Minor BA program in Japanese Studies, Department of Language, Literature, and Linguistics
- Minor changes to degree requirements for the Specialized Honours BA and Honours Minor BA programs in Cognitive Science, Department of Philosophy

Lassonde

- Changes to the English-language facility requirement for admission to the BEng programs
- Minor changes to degree requirements for the BEng programs in Civil Engineering, Mechanical Engineering, Space Engineering, and Electrical Engineering

The Senate of York University – Minutes

- Minor changes to degree requirements for the BSc in Earth and Atmospheric Science

8. Academic Policy, Planning and Research / Academic Standards, Curriculum and Pedagogy

a. Report of the Sub-Committee on Quality Assurance

APPRC and ASCP conveyed a report from the Joint Sub-committee on Quality Assurance.

9. Other Business

There being no further business, it was moved, seconded and *carried* “that Senate adjourn.”

Consent Agenda Items

10. Minutes of the Meeting of January 24, 2019

The minutes of the meeting of January 24, 2019 were *approved by consent*.

11. Changes in Degree Requirements: MA program in Social and Political Thought, Department of Social Science, Faculty of Liberal Arts & Professional Studies, Faculty of Graduate Studies

Senate *approved by consent* changes to the degree requirements for the MA program in Social and Political Thought, Department of Social Science, Faculty of Liberal Arts & Professional Studies, Faculty of Graduate Studies.

12. Closure of the BA programs in Multicultural and Indigenous Studies, Department of Equity Studies, Faculty of Liberal Arts & Professional Studies

Senate *approved by consent* the closure of the BA programs in Multicultural and Indigenous Studies, Department of Equity Studies, Faculty of Liberal Arts & Professional Studies.

13. Closure of the BA programs in European Studies, Department of Humanities, Faculty of Liberal Arts & Professional Studies

Senate *approved by consent* the closure of the BA programs in European Studies, Department of Humanities, Faculty of Liberal Arts & Professional Studies.

14. Closure of the BA programs in United States Studies, Department of Humanities, Faculty of Liberal Arts & Professional Studies

The Senate of York University – Minutes

Senate *approved by consent* the closure of the BA programs in United States Studies, Department of Humanities, Faculty of Liberal Arts & Professional Studies.

15. Closure of the BA programs in Environmental and Health Studies, Department of Multidisciplinary Studies, Glendon

Senate *approved by consent* the closure of the BA programs in Environmental and Health Studies, Department of Multidisciplinary Studies, Glendon.

16. Closure of the Certificate in Psychometrics, Department of Psychology, Faculty of Health

Senate *approved by consent* the closure of the Certificate in Psychometrics, Department of Psychology, Health.

F. van Breugel, Chair _____

M. Armstrong, Secretary _____

Synopsis

458th Meeting held on 26 February 2019

Appointments

Professor Sarah Bay-Cheng as Dean of the School of the Arts, Media, Performance & Design for a five-year term commencing 1 July 2019.

The following individuals to the Board of Governors for four-year terms effective 27 February 2019:

- David Garg
- Carole Malo
- Dee Patterson
- Narendra Singh

Approvals

The proposal to establish a Special Joint Senate-Board Working Group on Jurisdiction Related to Cancellation / Suspension of Classes during a Labour Disruption, conditional upon Senate approval, and confirmation of the slate of Board nominees to the Working Group (David McFadden, Bobbi-Jean White and Randy Williamson).

President's February 2019 report on appointments, tenure and promotion.

A \$43.5M budget for the construction of a NeuroScience Facility and additional office space, constructed as an expansion to the Sherman Health Science Research Centre, as well as the refurbishment of space vacated in the Behavioural Science Building.

An increase of \$3M to the \$8.2M Lions Stadium Conversion Project budget for a total project budget of \$11.2M, inclusive of HST, due to an amended project scope which will include the expansion of the turf area in addition to the installation of artificial turf and a seasonal inflatable dome.

In accordance with the Ministry of Training, Colleges and Universities' new Tuition Fee Framework, domestic tuition fees as follows:

- Maintain the current Board approved fees for domestic students during the 2019 spring/summer sessions.
- Apply a 10% tuition fee rate reduction for domestic students in programs eligible for provincial funding for the period 1 September 2019 to 30 April 2020.

York University Board of Governors

Synopsis

- Maintain a tuition freeze for domestic students in programs eligible for provincial funding for the period 1 May 2020 to 30 April 2021.

International tuition fees as follows:

- Fee increases of 10% in both 2019-20 and 2020-21 for international students in the Non-Professional Arts, Science and Other programs.
- Fee increases ranging from 0% to 10% for International Professional and Graduate programs.
- Fee reduction of (approximately) 5% for Schulich's Master of Supply Chain Management to align the program with fees charged for similar programs.
- No fee increases for International research-based Graduate programs.

A 2.40% increase to centrally collected ancillary fees in 2019-2020, effective 1 May 2019 as follows:

- For undergraduate students, an increase of \$0.53 per credit, from \$21.95 to \$22.48, resulting in an increase from \$658.50 to \$674.40 for full-time students (enrolled in 30 credits).
- For graduate students in professional programs, an increase of \$7.90 from \$329.33 to \$337.23 for programs charged on a per-term fee basis. Part-time graduate students pay 50% of the full-time fee.

2019 update of the ancillary operations long-term plans and related budgets.

The restated York University Pension Plan text, to reflect amendments approved since the text was last restated on 1 January 1992 as well as changes required by legislation.

The list of Major Capital Project Priorities.

Presentations

From the President on the substantive progress that has been made to advance the university's vision, comprising three components – amplifying scholarship, research, creative activities, innovation and knowledge mobilization for maximum societal impact, preparing globally educated citizens for success in a changing world, and enriching collaboration through elevated community engagement and internationalization – and on the importance of embracing innovation to effectively respond to challenges that have emerged such as recent provincial government announcements and the decline in domestic applications for Fall 2019.

From the President, Vice-President Finance and Administration, and Director of Internal Audit on the Risk Monitoring Report.

York University Board of Governors

Synopsis

Reports

From the APPRC-ASCP Joint Sub-Committee on Quality Assurance.

Brief reports from each of the Executive, Academic Resources, External Relations, Finance and Audit, Governance and Human Resources, Investment, and Land and Property committees on matters discussed in their meetings this Board cycle.

The agenda for the meeting is posted on the Board of Governors website:

<http://secretariat.info.yorku.ca/board-of-governors/meeting-agendas-and-synopses/>.

Maureen Armstrong, Secretary

APPENDICES

Academic Policy, Planning & Research Committee

- Appendix A: Discussion Paper and Action Plan on Achieving Planning Goals While Moving Towards Incomparable Metrics

Academic Standards, Curriculum and Pedagogy Committee

- Appendix A: Establishment of the Degree of Master of Management in Artificial Intelligence, Schulich School of Business, Faculty of Graduate Studies

Awards Committee

- 2017-2018 Undergraduate Award Disbursement Report
- 2017-2018 Graduate Award Disbursement Report

Achieving Planning Goals While Moving Towards Incomparable Metrics

Discussion Paper and Action Plan

Senate of York University
Academic Policy, Planning and Research Committee

Achieving Planning Goals While Moving Towards Incomparable Metrics

About this Initiative

In January 2017 the Acting Chair of the Academic Policy, Planning and Research Committee and the Chair of Senate invited Faculty Councils to respond to two questions set against University Academic Plan objectives and the Strategic Mandate Agreement metric imperatives:

How can York improve its tracking of progress and how can it use indicators to greatest advantage?

What specific indicators do you employ or should be employed to create the most inclusive possible set of indicators across the spectrum of scholarly, research and creative activities? Please provide concrete examples.

This specific form of engagement – styled “*Tracking Success Through Indicators*” - grew out of a facilitated discussion at Senate in November 2016 that was part of a “UAP spotlight” series in 2016-2017 highlighting priority areas. See Appendix D for the text of the Committee’s information item in that report, which pointed to long-standing goals in “Senate-approved planning documents from 2001 referencing research indicators, measures, and metrics...” The present exercise has a long genealogy but a strengthening impulse.

What are the current UAP objectives? Priority Area 7, *Advancing Exploration, Innovation and Achievement in Scholarship, Research and related Creative Activities*, includes these constituent goals:

- expand open access to York research in order to enhance visibility, open disciplinary boundaries and facilitate sharing knowledge more freely with the world
- significantly increase the number and proportion of researchers pursuing external research funding to support research projects, graduate students and postdoctoral fellows, and significantly increase research income in real and proportionate terms

York is committed to excellence in research and scholarship in all its forms. Engagement in traditional forms of scholarship outputs is *sine qua non* within the University’s research fabric. However, creating a narrative that more fully and fairly expresses the depth and breadth of the University’s research activities aligns with York’s vision as a comprehensive research-intensive institution. Portraying the comprehensive research profile cannot be done through conventional indicators alone.

Demonstrably increasing research quantifiable performance yields many benefits. We know, for example, that York is a “powerhouse in large-scale, collaborative research...a fact that should be exploited.” Others many not be cognizant of this truth and countless other successes. The Strategic Research Plan approved by Senate in May 2018 addresses indicators in these terms:

An important aspect of this exercise will be consulting with campus partners to build familiarity with commonly used research metrics, and to develop and promote approaches that better capture the weight and influence of scholarship and creativity produced by York scholars. There are several system-wide and specific institutional metrics and targets that are outlined in York's Strategic Mandate Agreement, which is co-signed by the Province of Ontario and which recognizes and emphasizes York's leadership role in research and innovation. Specific targets include increasing internationally collaborative publications, improving graduate student engagement, expanding student research as well as community-based research and entrepreneurship-supported initiatives. New institutional measures include using more widely the social media and web-based metrics available as these metrics are becoming increasingly important to tracking the success of our research.

Responses to 2017's request were received from all Faculties. In this report APPRC summarizes what it has learned from the submissions in the hope that they will benefit the community as planning goals are implemented. The Committee was at pains to stress in its questions that "responses are intended to launch a sustained collegial dialogue as we work toward realizing UAP objectives and to complement rather than supplant other processes (such as consultations on the Plan for Intensification of Research)." This summary report is organized around themes that emerged organically from the opening phase of this dialogue.

APPRC is mindful of the concerns expressed by the community about metrics and their use. One section of this document illuminates critiques and concerns. It should be recalled that metrics are a fact of life in the Strategic Mandate Agreement framework, and that funding for York, its researchers and students is tied to performance on conventional indicators. The allocation of research chairs is also dependent upon Tri-Council funding. Another compelling reason for undertaking these consultations is to influence the development and application of SMA indicators so that they are as broad as possible, take into account a full range of activities, fairly reflect the breadth and impact of research at York and other universities, have a grounding in peer review, and inspire faculty member colleagues and students to pursue opportunities for undertaking and disseminating research.

Action Plan

Since responses were received by APPRC, the Committee has reviewed them and requested this synthesis. It has also taken the following steps:

- arranged for a briefing by Librarians and Archivists on the Open Access & Open Data Steering Committee, the value of data management planning, and research metrics
- set in motion a task force on electronic CVs led by the VPRI (see appendix C)
- facilitated discussions by Senate of electronic CVs

Looking ahead, and coincident with the release of a discussion paper, the Committee has received the endorsement of Senate Executive to invite Librarians and Archivists to reprise their briefing for Senators. The ECV task force is expected to present its recommendations in 2019. Faculty Councils will be asked to share their thoughts on this paper in the next phase of discussion. APPRC urges Faculty Councils and units throughout the University to continue to explore these questions in collegial settings. The responses reflect York's diversity but there is much to be gained from reflecting on perspectives and practices rooted in local cultures.

Action Plan

1. As part of an ongoing, pan-University dialogue, transmit this discussion paper to Faculty Councils and the Libraries for further discussion and request details on the concrete measures being taken to enhance research cultures and better profile scholarship.
2. During the budget consultations conducted in the autumn of 2018, recommend investments in the resources necessary for Faculties and the Libraries to continue their efforts on developing metrics.
3. Transmit this discussion paper to the Provost and the Vice-President Research & Innovation as consultations in anticipation of SMA-3 negotiations.
4. Transmit this discussion paper to the Electronic-CV Task Force to help inform its deliberations.
5. Transmit this discussion paper to Senate coincident with a briefing by Librarians and Archivists on Open Access & Open Data Steering Committee, the value of data management planning, and research metrics.
6. Create a repository on the APPRC Website with links to:
 - reports from other universities or professional bodies
 - scholarly literature on the topic of metrics
 - impact case studies
 - existing metrics / indexes that the York University subscribes to:
7. As part of University Academic Plan 2015-2010 monitoring, give consideration to the possibility of a session devoted to what has been achieved and what we can do to achieve objectives.

Overview by the Chair of APPRC in 2017-2018

Professor Thomas Loebel prepared this overview for Senate in 2018 based on his reading of responses.

In 2017, APPRC asked Faculties, the College, and the Library which aspects of scholarly, creative and research activities are not normally covered by the methods of comparable metrics used by Ontario universities? Responses specific to the appropriate unit were in many cases similar or could generate a nomenclature which is, if not perfectly generalizable, then at least broadly shareable. The following list will allow us to

- recognize and address any gaps,
- generate the most efficient ways of collecting the information,
- create an effective way to balance comprehensive presentation with informative representation.

Initially APPRC asked about *output* and *impact*. What should be inserted between these two is representative *character*, provision of a sense of the diversity of work generated specifically at York as representative of our identity and ethos. “Interdisciplinary” is one, major characteristic. “Social justice and equity” names another. “Experimental” and “visionary” should not be lost. These labels need to be given shape. Why do they – and why does any of the work – matter, to what and to whom? Representative examples can help to answer that question.

Numerical data, therefore, can convey total output, which demand one type of attention, particularly as corrective of the partiality of comparable metrics and their means of collection; however, creating an effective, efficient narrative and visual mode of *representing* the character, quality, reach, and significance of York’s contributions of knowledge to society is fundamental for conveying York’s identity, different from other universities in subtle as well as surprising ways. Conveying the various types of *impact* of the work created at York university by our faculty, postdoctoral, and graduate student members overarches and connects number and character.

Formats not well counted by proprietary databases:

Print or Electronic

- chapter in book, paper in conference proceedings, catalogue essay
- any publication in a language other than English
- articles and reviews in refereed journals, sites, ‘zines, CD/DVD, podcasts
 - attention to the number of “hits,” (i.e., unique visits to online published material sites, and downloads)
- screenings at festivals
- materials for scholarly and educational purposes,
- reports for community organizations
- other outputs designed for non-academic audiences.

Creation

- Performances or exhibitions of work, group or solo, in juried competitions, installations,
- key involvement in short productions in the arts or any discipline, if applicable.
- A major output, such as a full-length theatrical work, large solo exhibition, long film/video, original composition or choreography
- Community-based or realized projects
- relevance of the venue to the work

Organization/Participation/Collaboration

- conferences organization and/or leadership
- workshops and seminar organization extra to the university
- curatorial activities and curatorial leadership
- organization/creation of special archives, scholarly databases
- Contributions to public service and various forms of advocacy, including expert testimony or advice to regulators, government and civil society organizations; activism
- guest editorships, work on editorial committees and advisory boards of various kinds
- volunteering with external agencies of various types
- collaborations with colleagues outside York or with non-academic bodies

Invitations

- keynote addresses to academic and non-academic communities (conference & events)
- participation in performances, installations, exhibitions, talks, panels, roundtables ...
- Commissions of work and the process for commissions
- Invited expert reports to inform policy
- consulting for government and NGOS

Applications

- grants/award and achievement of “fundable but unfunded status” (merit)
- Non-Tri-Council grants and other sources of funding

Impact & Influence

- community partners/stakeholders
- policy writers and practitioners
- Student engagement and training
- Knowledge Mobilization (KM) events and activities
- Impact on traditional and social media; Assessment should consider
 - Impact case studies:
 - choose particular cases to illustrate the broader scope of what is done.
 - qualitatively / quantitatively describe activities occurring in “microclimates” as indicators of larger data/contexts.

- represent the longitudinal impact of research and contributions on disciplinary practice
- Infographics:
 - mapping research engagement/impact and involvement geographically across a relevant region
 - communicate type, scope, and duration through colour-coding and embedded graphs
- academic, professional, and global impact have to be assessed and tracked differently; for instance, a published article in a Nursing journal can have more professional and global impact than, while not to the exclusion of, academic impact
- research which has helped to build education models and develop new degree programs in other countries
- research downloads from open-access repositories

The sections that follow expand on and contextualize this summary.

I. Commonly Used Indicators

University and unit research rankings typically rely on quantifiable inputs and outputs -- grants and other research income, journal articles and citations – collectively and per capita (intensity). One goal of our *University Academic Plan* is to improve performance on such conventional metrics, notably by encouraging faculty members to apply for funding from the national agencies and seeking out funding through partnerships. Higher numbers of applications, along with mentorship and feedback, translate into greater success in tangible ways, including the amount of funding and funded positions available to the institution and graduate students.

It is widely recognized that these indicators do not tell a complete and accurate story of York's research. Yet Faculties and units regularly collect and project data on scholarly activity, including the following:

This is a worthwhile endeavour not only in and of itself, but is also worth pursuing to demonstrate to the provincial government, to our colleagues at other universities, and to current and prospective students that York is a research-intensive institution.

- lists of journal articles, research monographs, published cases, funded and competitive research grants, scholarly presentations, invited presentations, published textbooks, and other teaching materials (in Schulich's case, accompanied by analyses of the breadth of faculty engagement and production of intellectual contributions within each discipline)
- awards, recognition, editorships, and other forms of validation of the accomplishments of faculty through their intellectual contributions
- publications in highly recognized peer-review journals (with data refined to publications in top journal percentiles)
- awards from competitive grant competitions from major national or international agencies
- measures of research output (e.g., citation count, citations per publication and field-weighted citation impact);
- research productivity (e.g., income measured per faculty member)
- publications through practitioner journals
- conference presentations, workshops, and invited speaking engagements to professional communities of practice outside of the academy

Schulich reports that its biennial appraisal measures activity in research, teaching and service and provides recognition as well as advice and support for improvement. York fares better on rankings based on discipline normalized scores, which can use publicly available data but take into account impact¹. Influence and impact can also be exerted, and scholarly excellence demonstrated, by other means. It may come as a surprise, but York research is second among Ontario universities in references to research in both print and new media.² But there continue to be important reasons for tallying, including the objectives of the University Academic Plan and Strategic Research Plan, both approved by Senate.

¹ Jarvey, P. and Usher, A. (2012). *Measuring Academic Research in Canada: Field-Normalized University Rankings 2012*. Toronto: Higher Education Strategy Associates.

² Vice-President Research and Innovation, Report to Senate, November 2017.

II. Toward Collegially-Defined Indicators (Qualitative and Quantitative)

The UAP calls for more inclusive expressions of research activities to impart a better sense of their range and impact. This is because, as discussed in more detail below, routinely accessed metrics are limited. To take but one example, as Glendon noted, tracking is more reliable for books and chapters published in English. Other submissions pointed to gaps in tracking works first published or translated into languages other than English, the *lingua franca* of global publication, something that APPRC members know from first-hand experience. Similarly, Tri-Council grants are picked up with relative precision while other forms of funding are hit-and-miss. To cover these lacunae, colleagues have nominated other ways in which research activities; engagement and impact can and should be documented. The following alphabetized list compiles suggestions made by Faculty Councils – many but not all of a kind that appear in CVs:

Any metric has its advantages and disadvantages. A particular disadvantage is susceptibility to 'gaming'; to mitigate, seek to adopt a diverse range of metrics, drawing from so-called conventional metrics and 'alt'-metrics; develop techniques to synthesize

- academic "products" such as technological outputs, which may not live or be used exclusively within academic institutions but are the product of academic research and development (these include apps, online platforms, digital humanities tools, and open-source initiatives)
- academic lectures outside York (community service involving lectures to community groups, serving on panels and other community advisory organizations, and doing voluntary work for community and voluntary organizations)
- appointments as visiting professors or scholars at other institutions
- articles published in French, Spanish, and other languages
- artistic productions— theatre pieces, films, performances.
- books and book chapters published in French, Spanish, and other languages
- case studies of research that leads to the adoption of new teaching/learning practices
- catalogue essays, film or media programming, exhibition or event curating, CD/DVD publication, screenings at film festivals
- coaching, i.e., assisting in the professional development of others – using professional expertise to coach others
- commissions and the process for commissions – works, performances, public art taking into account that there are disciplinary hierarchies
- communicating with, and organizing events for York alumni
- community partnerships and projects along with contributions to community and social activities (paid and unpaid)
- curatorial activities and curatorial leadership
- development of instructional software
- editing journals and serving on editorial boards (editorships and associate editorships)
- elections to leadership positions in academic and/or professional associations
- engagement in a research linking local, national and international research teams
- evaluation of tenure and promotion files
- external recognitions for research quality

- graduate supervision, and serving on supervisory and examining committees of graduate students
- graphic design / juried competitions / installations, group or solo art exhibitions (which can be in a range of venues, whether art gallery, public site, or the web) / key involvement in short theatrical/music/dance performance, short film or video
- guest editorship of journals and other publications
- invitations to participate in research conferences
- invitations to present keynote addresses, performances, installations or to participate in exhibitions, conferences, screenings, etc. taking into account that there are disciplinary hierarchies
- Knowledge Mobilization (KM) events and activities
- major output such as a full-length theatrical work, large solo exhibition, long film/video, original composition or choreography taking into account that there are disciplinary hierarchies of venues, galleries, theatres
- media contributions (including expert commentary) – TV, radio, newspapers, journals, blogs, Twitter etc.
- mentoring younger colleagues on a variety of matters
- non-conventional forms of knowledge mobilization: special archives, scholarly databases, audiovisual materials for scholarly and educational purposes
- non-Tri-Council grants and other sources of funding for scholarly or creative activities
- number of hits, unique visits to online published material sites
- online publications, both in peer-reviewed, online, open-access journals and in other venues with high impact and circulation
- organizing conferences and sessions at learned society meetings, at York and elsewhere, and presenting conference papers, acting as a discussant and serving on panels
- patent awards
- public service through advocacy³ and influencing public policy
- publishing of textbooks that are widely adopted
- refereeing papers for journals/ book manuscripts
- research funding pursued but not necessarily awarded (fundable but unfunded), where appropriate to the candidate's program of scholarly/creative research
- research-based learning projects with companies, and/or non-profit organizations
- reviewing books and articles
- reviews of faculty work by others in discipline specific journals, E- zines, etc.
- scholarly or creative work recognized as innovative or groundbreaking in the field, and is published, performed or displayed in high quality venues, taking into account that there are disciplinary hierarchies of venues, galleries, theatres

³ Many do research on policy and are recognized experts in these domains. As such, we are often invited to provide expert testimony or advice to regulators, government and civil society organizations. Some of us are also invited to activities that are activist in nature and in which the scholarly background is welcome. These types of work, central to several fields, have been and continue to be under-recognized within academic frameworks.

- student engagement and training through our scholarly work and research
- textbooks that are widely adopted
- trans-disciplinary work that does not appear in publication form in well-established journals
- use of academic work in doctoral seminars
- visiting fellowships
- widely used instructional software
- international collaborations in the form of research networks, conferences, and other forms of global scholarly engagement

Note on Impact Case Studies and Infographics

Two ideas emerged from discussions in the Faculty of Education that were thought capable of helping to document research impact and achievement both qualitatively and quantitatively:

Impact case study: In the UK they are moving from reports on “outcomes” to “impact” by creating *Impact Case Studies*. Units choose particular cases to illustrate the broader scope of what is done. We can potentially qualitatively/quantitatively describe what is happening, in “microclimates” as indicators of larger data/contexts, or as examples of larger data.

Infographic: Mapping faculty research engagement/impact and student involvement geographically across the GTA, the province of Ontario, Canada and the world. An *infographic* could communicate type, scope, and duration through colour-coding and embedded graphs.

The advantages of this approach were said to include the following:

- An *impact case study* could document the longitudinal impact of our research and contributions on educational practice in schools, community and social agencies.
- Enhanced partnership engagement in “telling the story” through stakeholders statements of impact testifying to the scope of influence of the research and/or project impact.
- Focus on scope and variety, using “indicators of influence” not currently captured by conventional measures.
- Provide thick description and concrete examples to qualitatively account for how our research and scholarship has influenced particular groups/populations or trace its role in shaping federal or provincial policy
- Provide a more comprehensive profile of the scope and range of work of produced by faculty.
- Enhance data management: Provide for a more flexible and comprehensive university-wide indicator

- It was suggested that a course release each year could be granted to those who would write an impact case study to contribute to the Faculty's documentation. This course would release the burden of administrators and individuals and provide an incentive to complete this task. If we build a system/cycle into the process of collecting this information, it has the potential to be more sustainable, and faculty members might be able to create publications out of the same content, too, solving two problems at once.
- Data management related to newly-implemented indicators could be created as a project for reliable grad students each year, who could be trained on the methods of data collection (under faculty supervision).
- Could coordinate with not-for-profit organizations which often use "logic models" to show the inputs required in order to create intended "impacts" (See <https://www.wkkf.org/resource-directory/resource/2006/02/wk-kellogg-foundation-logic-model-development-guide>).
- Collecting qualitative data is helpful; having a standard set of questions or a template/graphic organizer to complete can also help to tell a compelling, succinct and understandable story to people from outside the Faculty and outside the university. We must be mindful of who is collecting the data and how.

III. Additional Available Indicators and Accessible Databases

Members of the researcher community are aware that the databases used to track research are incomplete or inconsistent. They can also be biased, costly to access and narrow. The University is working with companies to overcome some of these deficiencies. Some respondents noted that Google Scholar can be superior tool but is far from reliable. In general, *altmetrics* offered meaningful ways to develop more inclusive indicators. It was felt that York would be best served by using a plurality of indices, including open- access sources, rather than trying to identify one database that will adequately encompass all. APPRC and Senate were given an example of this in November 2017 when Vice-President Haché reported that York researchers are second in the province of Ontario when it comes to references in positive mainstream media coverage of research. YUL offered examples of other tools in an annotated list citing the following:

Open Syllabus <http://opensyllabusproject.org> Useful tool for a researcher if books or book chapters written are required or recommended frequently in course syllabi. In relation to this tool, *course proposals* can be mined to identify York authors that are listed the most in the bibliographies.

Bookmetrix <http://www.bookmetrix.com/> A Springer product that helps authors see if their books are being cited, discussed, or used around the world.

Gobi, ProQuest OASIS, and OCLC Worldcat Two of the dominant book vendors serving academic libraries in North America. These tools can be useful to identify books' sales numbers. In addition, *OCLC Worldcat* can help identify the number of OCLC member libraries that own a particular title (or edition/imprint of a particular title).

ORCID identifiers <https://orcid.org/about/what-is-orcid/mission> allows for credit to be given to scholars for their broader contributions to the scholarly ecosystem. This example discusses how ORCID can be used to recognize peer review contributions: <https://orcid.org/blog/2016/09/22/recognizereview-orcid>

Publons (<http://www.publons.com>) initiative can help scholars “showcase their peer review contributions across the world’s journals”.

Some scholars, editors and journal publishers, upon “recognizing the need to improve the ways in which the outputs of scientific research are evaluated, developed a set of recommendations, referred to as the San Francisco Declaration on Research Assessment”. More information on this initiative can be found at <http://www.ascb.org/dora/>

YorkSpace (<https://yorkspace.library.yorku.ca/xmlui/>) York’s institutional repository where York University community members can post and disseminate their scholarly outputs. YorkSpace has the capability of tracking download statistics. Beyond scholarly articles, YorkSpace also houses other types of work, such as theses and dissertations, videos, images, data, etc.

YUL also commended this resource at

<http://www.library.yorku.ca/web/research-metrics/>.

Of particular interest is a best practices document which enumerates a wide array of metrics for a number of different types of scholarly outputs: journal articles, books, creative works, and non peer-reviewed publications curated in repositories.

IV. Limitations of Current Databases

English is the *lingua franca* for international scholarship. Publications in other languages are not well captured a context that is of particular importance to Glendon. This is but one drawback. Respondents pointed to these limitations:

- current tools available for measuring standard bibliometrics and altmetrics do not accurately or adequately quantify research output or impact, especially in social sciences and humanities disciplines
- altMetrics are currently non-standardized and of limited comparative value
- quantitative systems of measuring research uncommon in social sciences and humanities disciplines - not part of research culture or practice
- quantitative systems of measuring research output can produce unintended disruptions to or distortions of research processes

Whatever its faults, peer review, with its irreducible focus on qualitative judgment, lies at the core of the governance of the research process. It is indispensable for understanding the value of what we do as researchers, and how to encourage and promote new kinds of research contributions.

- quantitative systems fail to capture influence of scholarship on communities outside of academia; community-engaged research; public scholarship; popular dissemination; contributions to public discourse and debate
- quantitative systems do not measure application of research findings in policy development
- for Sophia and SciVal, a profile must first be created for each Faculty member that is based solely on publicly available data and these generated profiles may not necessarily capture all collaborative work with colleagues outside York or with non-academic bodies; the same consideration must be made for books, book chapters and book citations
- tracking of open access sources is spotty even though many early-career scholars are taking advantage of online publication
- they do not track well the work done by contract faculty members and graduate students
- because they are institution-specific, the relative standing of Faculties is obscured
- professional networks and associations produce publications that are not factored into metrics
- social media are not well covered

Lassonde surfaced the issue of eliminating barriers to researchers from underrepresented and/or marginalized groups (for instance, women and others):

It is felt that one aspect of these barriers concerns systematic bias in the characterization and/or measurement of performance. This often arises as a factor in hiring processes, but just as well concerns performance post-hire. One technique for mitigating this effect is to unpack the metrics, examine the ways in which they rely on ‘traditional’ career paths and career trajectories, and build in compensatory mechanisms. Draw on the body of work that is employed in build more equitable hiring practices.

A number of responses stressed the ongoing of peer review as a gauge of scholarly contributions. It was argued that “measurement should be carried out by: peer review (the customary process of evaluating research output and impact); third party peer reviewers with field-relevant expertise consider the research output and impact of colleagues / employing a qualitative peer-review approach to the analysis of scholarship is the optimal method of developing research indicators.”⁴

V. Concerns and Critiques

There are deeply felt and thoughtfully expressed worries about “simplistic and compulsory...metrification” in the collegium For some respondents, efforts to impose metrics should be resisted as being fundamentally at odds with the solely reliable form of assessment in the academy— peer review. Peer review, it should be recalled, is the basis for academic recruitment and promotion

⁴ Liberal Arts and Professional Studies’ submission.

LA&PS Council would like to express its dissatisfaction with the use of simple metric indicators to evaluate scholarly work in our Faculty and expresses concern about the well-known shortcomings and perverse effects of such metrics on scholarship, particularly in humanities, social sciences and interdisciplinary research. We urge the Office of the Vice President Research & Innovation to work with us toward the creation of a more appropriate way of capturing the diversity of our research.

- LA&PS Motion, Faculty Council Meeting, February 2017

processes along with procedures for allocating research grants and internal and external awards.

The minutes of the Senate meeting of January 26, 2017 record a number of reservations:

- there are inherent difficulties and distortions associated with the measurement of research whereby traditional indicators downplay or miss significant activities; peer review is and should remain of paramount relevance in the assessment of research
- understanding why York is not reaching its self-defined goals requires a longer, deeper, wider discussion
- there are worries that indicators could be used for the purpose of individual performance assessment
- York's message to governments and funding agencies should be that the shortcomings of metrics are increasingly well documented and are inimical to sound public policy

These adumbrated reasons for resisting the imposition of metrics provided by some Faculty Councils including the following:

- the possibility or some said likelihood that certain kinds of metrics will steer research in directions that are inimical to independent inquiry
- the introduction of indicators that are more suited to – or at least more common in -- other sectors that are alien to higher learning
- quantification will downplay other forms of scholarship and its assessment
- heterodox perspectives and interdisciplinary work will be diminished
- American titles dominant so-called “high impact” journals and researchers may be pulled away from Canadian titles
- researchers may respond with “salami slicing” – producing more publications to express the same number of ideas and findings – or “risk aversion” where they tried familiar pathways for quick payoffs instead of seeking innovation
- indicators are attended by an alien framing language – “measurement” as opposed to “demonstration,” a preferable concept that can more revealingly capture both quantitative and qualitative
- the undoubted commercial interests that citation databases and, in some cases, their ties to subsidiaries that are involved in (for example) the weapons trade in the case of Elsevier's subsidiary Reed Exhibitions; the market ethos of these companies narrows the range of publications, discriminating against languages other than English and resisting tracking research activities that are not profitable in the metadata economy
- the failure of databases to take into institutional hierarchies and equity dimensions such as funding, relative workloads, access to supports
- the kinds of activities that have enhanced York's reputation – community-based research informed by a commitment to social justice – and simply not represented
- conventional indicators privilege STEM disciplines over non-STEM fields

For some respondents, York should seek to impact and influence rather than rely on quantification. LA&PS noted that “there are serious concerns about the use of journal-level

impact factors, discussions are on-going regarding the San Francisco Declaration on Research Assessment (DORA).”

Another problem that was raised turned on the differences in research intensity across Faculties. The University’s overall ranking may be skewed by such differences in standard indicators.

A Note on Metrics for Other Activities

Under SMA2 York’s funding is protected. In the next agreement, more of the grants will be based on the University’s performance on a range of indicators. Although the focus of the exercises falls on research in the main, respondents were also asked to comment on other forms of measurement.

Asking graduates how much money they are making after graduation is not an indicator of success - this metric needs to be thrown out.

We did receive a few helpful comments, such as the suggested of a follow up with students several years after graduation when they will have a better sense of the full value of their York education, how it paved the way to employment, and their overall satisfaction or dissatisfaction.

As the President, Provost and APPRC indicated in 2017, it is not too early to begin a collegial conversation about University-specific indicators that will cast York in the best possible light and maximize our funding while influencing system-wide metrics.

VI. Recommendations as the Dialogue Unfolds

The Glendon submission stressed that “information gathered in this process should not be used to pressure individual faculty to adjust their research to conform to tracking mechanisms, especially in the case of junior untenured faculty; and once York has established its approach to tracking research productivity, those criteria should be subject to regular review and revision so that we ensure they continue to reflect the faculty’s research priorities and to capture traditional categories as well as innovation — disciplinary shifts, new programs, changing contexts.” APPRC agrees with both propositions. The Committee was also urged to “conduct the exercise judiciously and circumspectly to avoid inequitable treatment of units and faculty members and to avoid counter-productive pressure to generate research outputs inspired and driven by the demands of the exercise rather than for the advancement of knowledge?”

Investigate

- investigate/foster deep awareness of instrument validity (i.e., the degree to which the measurement instrument, in this case, a performance metric, is actually measuring the thing it is purporting to, as opposed to some other aspect of process).
- contextualization of any metric is keenly important. Quantitative analyses often afford (and indeed even encourage) ‘apples-to-oranges’ comparisons. Analyses of these issues should be understood and taken up carefully (for instance, the 2016 monograph

by University of Quebec CRC, Yves Gingras, in "Bibliometrics and Research Evaluation Uses and Abuses", MIT Press)

- metrics should properly recognize interdisciplinary/multi-faculty research projects.
- metrics should take into consideration differences within publishing cultures. For instance, some research cultures involve publications with extremely long lists of authors, whereas other areas involve publications with relatively few authors.
- metrics should distinguish between quantity/quality.
- consideration should be given to "Alt"-Metrics vs "non-Alt" metrics
- consideration should be given to research outputs (from STS researchers, both at York and elsewhere) which demonstrate biases, confounding, and instrument invalidity, in bibliometrics
- afford the opportunity for faculty members to participate in the exercise of identifying the top-tier publication venues for their own research areas (as opposed to employing other techniques, such as journal impact factors). This is seen as a possible means to mitigate problematic reliance on journal impact factors
- ensure that confounding factors are neutralized through normalization; examples of confounding factors: presence of a medical school in the institution, access to particularly large and well-developed research infrastructure.

Coordinate

- take the opportunity to align this metric-identification exercise with a similar exercise that is presently underway in LSE related to its own research intensification initiative. LSE seeks to take advantage of the opportunity and will continue efforts in this direction
- develop a discipline-specific list of outputs in consultation with other universities since others may also benefit from a listing; such collaboration may impact on the provincial government
- York (or York in conjunction with other Ontario universities) should consider developing its own proprietary database of research outputs
- coordinate with not-for-profit organizations which often use "logic models" to show the inputs required in order to create intended "impacts" (See <https://www.wkkf.org/resource-directory/resource/2006/02/wk-kellogg-foundation-logic-model-development-guide>)
- the discussion about performance indicators should be conducted in close consultation with libraries. (On the one hand, there are dedicated librarians devoted to identify specialized sources—databases and others—for each field (e.g., language and literature departments have the MLA database as one of the main sources of scholarly literature in various fields and languages). On the other, libraries are sources of material on metrics and alternative metrics—the York library has been working in this area: <http://www.library.yorku.ca/web/research-metrics/>)
- The library's rigorous work, if completed in consultation with units, would help evaluate the choice of discipline-specific indices. In fact, one way to deal with the multilingual and diverse nature of our scholarship could be a system of metrics that integrates, among other elements, the data we find in our very own library databases. In more general terms, to achieve research excellence, York and other universities in Ontario and Canada should provide continuous support to libraries

- an opportunity exists to consider and to possibly employ the performance-based measures that are presently in use and/or under development in ORU's (such as CRESS, CVR, possibly others).

Broaden

- develop strategies to measure and recognize scholarly and creative outputs that are not being tracked -- it is not sufficient to look for existing tools, as for certain fields and types of outputs such tools may not yet exist—e.g., often high visibility and impact contributions, such as awards, award-winning films, and other high-impact outputs, fall outside the scope of databases tracking traditional scholarly outputs, which are mainly English-language publications.
- York University has a tradition of community-based research informed by a commitment to social justice. The university houses projects and initiatives, both individual and collective—at the level of departments or research units—that include experiential and community components as an integral part of their research goals. This research-community relationship, its impetus, which is one of the features of the York community, must be recognized as a measure of excellence
- the criteria of research volume, impact, and intensity, are all closely linked to the specific kind of output that is being measured. Given the range and diversity of scholarly and creative outputs at York, looking exclusively at citations is a limited way of tracking research impact. Faculties would benefit from a discussion of how impact is measured so that the richness and diversity of Glendon's and York's outputs are not only recognized but also incentivized and supported
- given the strong reliance on contract faculty at York, and the large and vibrant graduate student community, it is important to have a clear strategy to recognize the contributions of these members of our academic community
- consider opportunities to report on Accreditation successes, and measures related to research (e.g., Engineering, Education, Law, Social Work, Nursing, Computer Science, etc.).
- demonstrate its excellence by focusing on specific research competencies in which we excel; these competencies refer to capacities among researchers to advance programs of research with a high degree of success (as opposed to looking merely at outputs without longitudinal context). Such competencies can and should be demonstrated via quantitative metrics. Such metrics are tools that can be useful when used correctly, particularly when they are in the service of a very clear and precise goal. Indices such as h-index are noted to be heterogeneous (i.e., composites which are measuring many different things simultaneously).

Platforms

- poll Faculty members to determine what they felt the five top areas of importance were and to use those to establish buckets for metrics -- from these we could determine what overlap existed and which areas to focus on

- since York's (public) faculty research profiles are a useful source of data⁵ [therefore] make the online system made more user-friendly and actively solicit participation in these research profiles; if it is clear to faculty members that their participation will help the University or their individual units, participation rate will increase
- collecting qualitative data is helpful; having a standard set of questions or a template/graphic organizer to complete can also help to tell a compelling, succinct and understandable story to people from outside the Faculty and outside the university. We must be mindful of who is collecting the data and how
- given the vibrant scholarly and creative community at York and the broad range of discipline-based, interdisciplinary, and professional programs of the university, for measuring performance the university would be better served by using a plurality of indices, including open-access sources, rather than trying to identify one database that will adequately encompass all
- the university has well-established, long-standing programs, as well as new programs it seeks to support and develop. Any discussion on metrics should take into consideration the use of tools that will appropriately represent the outputs of the faculty, including new hires, who are actively seeking various ways to contribute to their fields of knowledge and practice. Developments, and even shifts, in the content, framing, and forms of dissemination of research change constantly. A case in point is the emphasis on open-access publishing, which follows the ethical stance of aiming for increased accessibility. Another case in point is the diversity of publishing venues in specific fields, such as visual arts and communications. We believe that the university, as well as the province, must keep up with these shifts and adapt to changing scholarly environments.
- invest in a sophisticated database management system that enables York to "track" its research activities (it was noted that existing platforms, e.g. SOPHIA are suboptimal) and in turn, will be better positioned to report on its research activities and successes.

Graduate students

- track graduate student scholarships, conference presentations, and the number moving to postdoctoral fellowships
- consider converting TA funding to scholarships that are recognizable and important to include on CV's and resumes
- data management related to newly-implemented indicators could be created as a project for reliable grad students each year, who could be trained on the methods of data collection (under faculty supervision)
- look at outcomes in terms of graduates from the undergraduate and graduate programs; feedback includes looking at metrics that capture outcomes in terms of opportunities for undergraduate research, which is felt to be a strength of LSE; at the same time, there is the desire to not subordinate outcomes related to graduate-level students, and LSE does not wish to give the false impression that its program of research is solely undergraduate- focused. Metrics that concern outcomes of graduate-level students are important to LSE

⁵ These profiles are maintained by individual faculty, and the participation rate is low. In our opinion, there are two reasons for this: (i) some faculty members are unwilling to disclose their research activities; (ii) the faculty research profiles are not terribly user-friendly, and some faculty members cannot be bothered to update them.

Appendix A: References Cited in Responses

Bruce, Herbert (2016). Best Practices for the Use of Scholarly Impact Metrics. Available electronically from <http://hdl.handle.net/1969.1/156054>

De Rijcke, S., Wouters, P. F., Rushforth, A. D., Franssen, T. P., & Hammarfelt, B. (2016). Evaluation practices and effects of indicator use—a literature review. *Research Evaluation*, 25(2), 161–169. <http://doi.org/10.1093/reseval/rvv038>

Expert Panel on Science Performance and Research Funding. (2012). Informing Research Choices: Indicators and Judgment. Ottawa. Retrieved from <http://www.scienceadvice.ca/uploads/eng/assessments> and publications and news releases/science performance/scienceperformance_fullreport_en_web.pdf

Fry, B., & Osterloh, M. (2011). Rankings Games.

Gingras, Yves, *Bibliometrics and Research Evaluation: Uses and Abuses* (MIT Press, 2016)

Hasselberg, Y. (2013). In Defense of Discretion. In S. Rider, Y. Hasselberg, & A. Waluszewski (Eds.), *Transformations in Research, Higher Education and the Academic Market* (Vol. 39, pp. 137–144). Dordrecht: Springer Netherlands. <http://doi.org/10.1007/978-94-007-5249-8>

Haustein, S., & Larivière, V. (2015). The use of bibliometrics for assessing research: Possibilities, limitations and adverse effects. *Incentives and Performance: Governance of Research Organizations*, 121–139. http://doi.org/10.1007/978-3-319-09785-5_8

Hicks, D., Wouters, P., Waltman, L., Rijcke, S. de, & Rafols, I. (2015). *The Leiden Manifesto on Research Metrics*. *Nature*, 520, 429–431.

Hochberg, M. E., Chase, J. M., Gotelli, N. J., Hastings, A., & Naeem, S. (2009). The tragedy of the reviewer commons. *Ecology Letters*, 12(1), 2–4. <http://doi.org/10.1111/j.1461-0248.2008.01276.x>

Rafols, I., Leydesdorff, L., O'Hare, A., Nightingale, P., & Stirling, A. (2012). How journal rankings can suppress interdisciplinary research: A comparison between Innovation Studies and Business & Management. *Research Policy*, 41(7), 1262–1282. <http://doi.org/10.1016/j.respol.2012.03.015>

Shekman, R. (2013). How Journals like Nature, Cell and Science are damaging science. *The Guardian*. Dec 9, 2013. Retrieved from <https://www.theguardian.com/commentisfree/2013/dec/09/how-journals-nature-science-cell-damage-science>

Simpson, W. & Emery, J.C.H. (2012) Canadian Economics in Decline: Implications for Canada's Economics Journals. *Canadian Public Policy*, Vol. 38. No. 4, pp. 445-470.

Smith, Richard “Reed-Elsevier’s Hypocrisy in Selling Arms and Health,” *Journal of the Royal Society of Medicine*, v. 100.3 (2007): 114.

URB Task Force Steering Committee. (2016) Support for Research in Social Science, Arts, and Humanities at Western. University Research Board. Western University

Werner, R., The focus on bibliometrics makes papers less useful. *Nature*, January 13, 2015 <http://www.nature.com/news/the-focus-on-bibliometrics-makes-papers-less-useful-1.16706>

Appendix B: Request of Faculty Councils in January 2017

To: Faculty Council Chairs

From: David Leyton-Brown, Acting Chair, Academic Policy, Planning and Research Committee of Senate
George Comninel, Chair of Senate

Date: January 16, 2017

Subject: **Tracking Success through Indicators**

We are writing on behalf of Senate's Academic Policy, Planning and Research Committee to invite your Faculty Council to participate in an important consultation concerning performance indicators, especially those related to scholarly, research and creative activities.

As the year begins, Ontario universities are gearing up for negotiations with the provincial government culminating with the signing of new Strategic Mandate Agreements. The *University Academic Plan 2015-2020*, approved by Senate in early 2016, anticipates the development of more performance-based funding based on a range of indicators. APPRC understands that some metrics emerging from the next SMA exercise will apply to the system as a whole while others will be university-specific.⁶

Over the years, members of the York community have frequently expressed dissatisfaction with the limited array of metrics most frequently utilized because they do not fully or accurately capture York's strengths, or fairly represent the kind, quality and impact of our contributions. This moment brings an opportunity to expand and refine metrics in ways that will better serve York along with other universities.

Through its approval of the University Academic Plan, Senate has made commitments to

- significantly increase the number and proportion of reportable research outcomes [and activities] by our scholars and enhance the means through which we can measure and articulate the full range of our scholarly outcomes from our work and their impact; and to
- collegially develop and confirm measures to be used for monitoring and reporting on our progress for all priorities taking advantage of repositories of best practice

APPRC is now in the process of engaging Senators in a discussion of research indicators. In doing we have signaled our intention to consult with colleagues throughout the

⁶ Commonly employed indicators include research income (overall and per faculty member), publication and citations.

University. With SMA negotiations in the offing, it is timely and beneficial to broaden the discussion now, and to seek the views of your Council on the following key questions:

How can York improve its tracking of progress and how can it use indicators to greatest advantage?

What specific indicators do you employ or should be employed to create the most inclusive possible set of indicators across the spectrum of scholarly, research and creative activities? Please provide concrete examples.

In making this request we want to emphasize that responses are intended to launch a sustained collegial dialogue as we work toward realizing UAP objectives and to complement rather than supplant other processes (such as consultations on the Plan for Intensification of Research). In that light, we ask that you respond by **February 10, 2017**. APPRC would welcome input from the appropriate committee(s) and / or Council itself. Feel free to comment on other measures of academic achievement you think relevant.

Please submit your responses to Robert Everett of the University Secretariat. Thank you in advance for your assistance.

Additional Context for Faculty Councils

The following communication was sent to Faculty Councils immediately following APPRC's meeting of January 19, 2017:

- in addition to the PIER referenced in the communication, you and your Council members may find it helpful to review Vice-President Haché's presentation to Councils during the PIER consultation process for illustrations of key indicators
- in addition to international collaboration, indicators might include publications in languages other than English or material published by foreign publications; it follows from this that your Councils may be help identify other ways in which the use of frequently used indicators or the addition of more inclusive indicators would provide a fuller, fairer picture of York research
- it would be helpful to know if there are journals that are not normally covered by research sources
- what aspects of your Faculty's scholarly, creative and research activities are not normally covered (for example, to curate perform, design, show and the like)?
- graduate students and post-doctoral fellows are also critical to York research, and there are several ways in which their contributions might be reflected -- are there indicators that are being missed such as publications, awards, major Tri-Council grants and honours, the number of graduate students, the collaborations they undertake and the like?
- do colleagues in Faculties conduct research that is distinctive or rarely undertaken elsewhere, or that may be under-valued; are there aspects of research in which York is cutting edge or clearly leading?
- are there ways in which research productivity has evolved over time in ways that are not properly understood?

Appendix C: ECV Initiative (Communication to APPRC from the VPRI, September 2018)

Electronic Curriculum Vitae (ECV)

Last spring APPRC asked VPRI to lead a campus-wide conversation on the development and implementation of an electronic CV tool for York faculty. A collegial Task Force will be established fall 2018 to evaluate the various ECV management software systems for eventual implementation at York. Suggested timeline: June 2019.

Current State

- No standard York CV
- Use of CVs heavily prescribed and require multiple formats for various purposes
- Use of Canadian Common CV is increasing among all three tri-councils as well as Canadian health charities

Faculty Benefits: A central repository for a faculty member's academic history. Assist faculty members by simplifying the creation and maintenance of their CVs through an intuitive software interface, allowing for ease of CV output across multiple formats including integration with CCV and all its funding templates. Faculty members can contribute data to their CV from various sources, gathering publication information from online databases such as Google Scholar. Software would capture all faculty including contract faculty, graduate students and PDFs, professional and alternate stream faculty at York.

Secondary Benefits: Enhance understanding of the full measure of scholarship, research and related creative activity being generated at York

- Better data for internal and external reporting including SMA reporting
- Maximize uptake of scholarly outputs by uploading previously uncaptured outputs into common databases (SciVal, Scopus)
- Support research planning
- Support large scale grant applications

Membership:

Chair- Vice-President Research & Innovation

Task Force Members:

- Representation from all Faculties including Libraries - solicited by APPRC Secretary via faculty listserve
- APPRC representative
- Postdoctoral Fellow and Graduate student
- Support from office of VPRI and Research Data Analyst

Meetings: Task Force to meet monthly, or as directed by the Chair. Meetings will include 2-3 campus-wide Town-Hall/ Open Forums as a part of the broader consultations with the York community.

Appendix D: Excerpt from APPRC Report to Senate, November 2016

Spotlight on the University Academic Plan 2015-2020: Priority 2. Advancing Exploration, Innovation and Achievement in Scholarship, Research and Related Creative Activities

APPRC and Senate Executive have agreed that time should be set aside at meetings of Senate this year to highlight one of the seven priority areas of the University Academic Plan 2015-2020. As reported in October, the series leads off with a discussion of Priority 2, Advancing Exploration, Innovation and Achievement in Scholarship, Research and Related Creative Activities.

The UAP commits to the achievement of the following objectives over the next five years.

1. Significantly increase the number and proportion of reportable research outcomes by our scholars and enhance the means through which we can measure and articulate the full range of our scholarly outcomes from our work and their impact
2. Enhance the quality and quantity of research and knowledge mobilization aimed at shaping the public debate, law and policy reform, social and economic enterprise, and improving the outcomes of York research for society
3. Increase the number of our research partnerships, and increase the networks and other points of contact between partners through the deployment of software, provision of training and other means
4. Expand open access to York research in order to enhance visibility, open disciplinary boundaries and facilitate sharing knowledge more freely with the world
5. Expand collaboration within the University and between faculty members at York and other individuals to make York more than the sum of its parts, and profile our faculty and their research
6. Enhance and project the profiles of our Organized Research Units
7. Significantly increase the number and proportion of researchers pursuing external research funding to support research projects, graduate students and postdoctoral fellows, and significantly increase research income in real and proportionate terms
8. Establish York as an innovation hub by increasing and promoting the translational and entrepreneurial activities offered by Innovation York, and the Knowledge Mobilization group, including the Markham Convergence Centre, LaunchYU and newly emerging innovation activities in the Faculties including enlisting media to extend our reach
9. Establish and implement an *Institutional Research Equipment and Facilities Plan* in collaboration with the Faculties for maintaining and enhancing the necessary infrastructure including space for student learning and tracking investments to ensure that they are commensurate with objective
10. Emphasize enhancing and increasing our population of graduate students and postdoctoral fellows (quality and quantity) and mentoring and supporting them in their research activities

There are ten goals, but a prominent feature of APPRC discussions this autumn has been on indicators of research. This reflects the Committee's interest in staying abreast of trends in public policy and postsecondary directions. It included a review of excerpts from major Senate-approved planning documents from 2001 referencing research indicators, measures, and metrics from Senate-approved or Senate-endorsed documents and cites initiative of Senate committees. In general, calls for measurement of quantitative research (and pursuit of external funding opportunities) have been coupled with the need to express the fullest range and impact of York's research through quantitative, inclusive and expanded indicators of research.

York's research is seen as high impact with mean standardized scores applied (as reported by the Higher Education Quality Council of Ontario citing Higher Education Strategy Associates, 2012) but lags in publications, income and citations per capita. This can have real consequences by feeding into the agenda of those who favour differentiated funding or who place, as HEQCO does, the University into artificially constructed and selective populated categories (e.g. "in between" or "regional"). Senators should be aware that the province has been receiving advice or receiving advocacy that would tier universities and tie funding to measures that do not take into account York's distinctive mission and strengths. To ignore the external environment is to risk funding for research, and we do have the capacity to anticipate and address antagonistic forces.

In the past, as now, there have been two key objectives in strategic plans:

- enhancing York's performance in funding competitions, deepening research cultures, promotion and supporting research grant applications, connecting the University's scholars with partners in the postsecondary, broader public / NGO and private sectors (and using existing data in beneficial ways)
- creating and utilizing more inclusive indicators

APPRC has been thinking about a role it might play in a collegial dialogue about metrics in order to employ conventional ones that profile York's strengths, impact and diversity, propose new or modified ones that would better describe York's (and other universities' research, and counter measurements imposed on the University. This could take a number of forms, and would certainly include working with and supporting the VPRI (PIER is designed to implement academic planning objectives). It may also be appropriate to consult the Faculties on their efforts to better profile their research, and to share what we have learned.

In reports over the past two years, APPRC has emphasized the opportunities all of us have to help recruit and retain graduate students and it is worth reiterating the importance of these to the University and its research. We welcome the thoughts of Senators on all other aspects of the UAP's priority 2.

YORK UNIVERSITY

Schulich School of Business

Master of Management in Artificial Intelligence (MMAI)

Program Proposal

February 15th, 2019

Task Force Members:

Murat Kristal (Chair)

Zhepeng (Lionel) Li

Mel Gabriel

1. Introduction

1.1. Brief Statement of the Program

The proposed Master of Management in Artificial Intelligence (MMAI) program is designed to prepare individuals to seek and obtain meaningful employment in artificial intelligence (AI)-related management positions, whether in private, public or non-profit organizations.

AI-related fields include, but are not limited to: data science, machine learning, visualizations, natural language understanding, intelligent robotics, knowledge representation, reasoning and management, intelligent agents, human computer interfaces, and recommendation systems.

The MMAI addresses a growing need in post-graduate management education for programs that train students in the task of managing the design and implementation of practical AI-related solutions and technologies. The objective of the MMAI is to produce such graduates. The proposed program is not based on any existing Master of Management in Artificial Intelligence. Rather, the program will be designed from the ground up. Program-level learning outcomes (see section 5 in this document and **Appendix A** for a detailed list of learning outcomes and goals) have been developed based on input from leading academics in the field of management and AI as well as potential employers from the private sector, government and the non-profit and social sectors. Curriculum structure and course contents have been developed to achieve these learning outcomes ensuring that our MMAI students acquire the knowledge and skills required to succeed as managers in business and non-profit organizations or as entrepreneurs. These include strategic thinking, managerial decision making, AI technologies, design techniques and ethics in AI. The MMAI's program structure, which includes a unique 2-term integrative hands-on consulting project, will ensure that the program is differentiated from competing programs (see section 3.2 below for details on program differentiation).

In addition to meeting the quality standards of the Schulich School of Business, York University and the province of Ontario, the MMAI has been designed to fulfill the standards set out by the Vector Institute (Vector) under the heading "1000AIMs." Vector's 1000AIMs initiative was established to support the province of Ontario's goal to produce 1000 graduates annually in the field of AI within five years.

Thus, in sum, the MMAI is a professional degree program in the management of artificial intelligence. The degree focuses on strategic thinking, managerial decision making, AI technologies, design techniques and ethics in AI. The objective is to produce well-rounded managers who have the potential to become leaders in AI-management.

1.2. Endorsed Fields of Study

N/A

1.3. Method Used to Develop the Program

The program has been designed by a Schulich-based task force established by Dean Horvath. The task force obtained input from all relevant subject matter disciplines within Schulich, from prospective students, and from potential employers in a wide range of sectors.

To develop the learning outcomes and curriculum content the task force conducted interviews with management practitioners in industry and government, with consultants, and with industry associations. In addition, the task force used detailed job descriptions developed by expert panels from The Vector Institute for Artificial Intelligence to fully understand the emerging trends in AI and the expected knowledge requirements for graduates aspiring to enter careers in AI-related fields. Finally, in designing the program's goals and curriculum the task force consulted the Vector Institute's 1000AIMs guidelines released April 5th, 2018 for recognized AI-related master's programs.

The learning outcomes in turn informed which courses are needed to provide future graduates with the required knowledge and skills. The program's draft curriculum was discussed again with potential employers for a last round of input in order to validate the program design.

1.4 Faculty in which the Program is Housed

The program will be housed in the Schulich School of Business.

2. General Objectives of the Program

2.1. Brief Overview

The Schulich School of Business proposes to establish a Master of Management of Artificial Intelligence (MMAI) program to prepare students with the necessary skills and knowledge to obtain entry-level management positions in business or other types of organizations (e.g., nonprofit organizations, governmental bodies, or entrepreneurial start-ups) upon graduation. The overall objective of the program is as follows:

The Master of Management of Artificial Intelligence program provides specialized education in the management of AI. The program emphasizes managerial and technical skills needed to leverage emerging AI technologies for the generation of insights and solutions to challenges organizations face in rapidly changing business and policy environments. Students are challenged to consider both theoretical and applied perspectives of management and AI-technologies. While teaching hands-on skills necessary for initial employment, the overarching goal of the program is to create managerially competent, creative thinkers that have the potential to become thoughtful leaders in a world of rapid technological change.

The program is designed primarily for students who have recently graduated from a non-business degree program such as science, engineering, liberal arts, and applied arts. In addition, the program may attract some individuals who have worked in other fields of business and wish to add management of AI to their skill set.

We aspire to graduate individuals from the MMAI program that:

- are intellectually curious and prepared for continuous learning;
- exhibit leadership and/or entrepreneurial qualities;
- are effective communicators and can lead teams;
- are able to use cutting-edge AI techniques;
- are well versed in methods of management;
- are able to effectively manage AI-projects; and
- are conscious of his/her own and the organization's ethical and social responsibilities.

The program will achieve these objectives over the course of three terms of full-time study and the completion of 45 credits. The program is structured to facilitate the acquisition of AI and management knowledge and skills over these three terms. A key component of the program is the integration of the acquired knowledge through a capstone community-involved experiential learning project (the so-called AI Consulting Project, or AICP). This project will take place during the 2nd and 3rd terms. During the AICP students will make extensive use of the newly developed Schulich Deloitte Visual Cognitive Analytics Lab.

2.2. Alignment with University and Faculty Missions

This program will support the University's goals as outlined in the 2015-2020 UAP as follows:

- *Academic Quality and Student Success.*
The proposed Master of Management in Artificial Intelligence program is specifically designed to provide a professional managerial education to high-performing post-secondary graduates as well as qualified individuals who are currently working but eager to augment their skill set. The Schulich School of Business is recognized worldwide as a leader in management education. The proposed Master of Management in Artificial Intelligence program not only draws from existing expertise but also brings into the classroom world-class instructors from outside the School ensuring that graduates from the program are at the leading edge of AI management knowledge and practice.
- *Enhanced Quality in Teaching and Learning and Internationalization.*
The program will be open to eligible applicants from all recognized universities worldwide, thereby enhancing achievement of York University's internationalization objective. As with Schulich's other specialized Master programs as well as the MBA, we expect a substantial number of applications to come from individuals outside Canada.

The program will feature the highest quality in teaching and learning. Instructors

will be selected from Schulich's tenure stream faculty and highly experienced industry experts thus ensuring first-rate teaching. In addition, this program offers cutting-edge experiential learning. Similar to Schulich's other programs, this program will use high impact teaching practices throughout all three terms. In particular, the two-term Artificial Intelligence Consulting Project (AICP) offers a unique learning experience to students in the program (for details on the AICP see Appendix B and H). As such, the University's goals of pedagogical innovation and a high-quality student experience are addressed.

- *Enhanced Community Engagement.*

The program's learning outcomes have been informed by extensive input from the professional community. In addition, AICP is community-involved. During the last two terms, students will work with organizations to help them analyze and solve real-live problems in a hands-on fashion.

University Goals

This program aligns with York University's Strategic Mandate Agreement on many fronts. The program's innovative combination of management and technology training drives York's aspiration for unique learning experiences. The two-term Artificial Intelligence Consulting project creates a truly innovative student experience. This project offers students an opportunity to apply theories and concepts to a real-world company problem under the supervision of experts from academia, business and non-business organization. Based on applied research this project makes an impact in the community, one solved problem at a time. Furthermore, the MMAI is supported in material ways by strategic partnerships with community members. For example, central to the learning experience of the students is their use of the innovative Deloitte Schulich Cognitive Analytics and Visualization Lab. The lab and in extension the student projects are supported by a world-class data scientist. Both, the lab and the data scientist are financed in partnership with Deloitte. Finally, York University's Strategic Mandate Agreement identifies business as an area of both strength and growth. This new program aims to contribute to this growth at the graduate level. By providing a net addition to the University's Masters complement, it will help the University to address its goal of enhanced graduate studies, research intensification and reaching the masters- level enrolment target.

Faculty Goals

The Schulich School's academic plan calls for the School to be global, innovative, and diverse. The Master of Management in Artificial Intelligence program exhibits all these attributes. The program introduces graduate-level management education to individuals who are academically highly qualified but lack managerial knowledge and experience, and offers this preparation to a diverse group of students of widely varying backgrounds, nationalities and work experience levels. At the same time, the program furthers the Faculty's shared goals of pedagogical innovation in terms of optimized, outcome-oriented curriculum design and the use of experiential, community-involved, and high impact teaching practices. It helps the Faculty round out its offering of direct-entry programs in core and emerging management areas and implement its pipeline model of continuing education that spans from an undergraduate degree to a specialized master's degree to a senior leadership degree (MBA) or PhD.

3. Need and Demand

3.1. The Rise of Artificial Intelligence as a Management Concern

Due to the confluence of recent technological breakthroughs and societal changes, Artificial Intelligence – e.g., deep learning, machine learning, natural language processing – has become an increasingly important focus for research and practice in fields such as computer science, information systems and management studies among others.

Over the next 15 years, Artificial Intelligence will transform the private and public sphere (Internet, media, mobile-based assistance systems, electronic voting, autonomous transportation, voice guidance systems, medical care, etc.) as well as business (FinTech, AI-enabled marketing, intelligent healthcare, intelligent logistics systems, smart manufacturing, process automation, smart cities, smart energy, etc.). Some companies have begun to adopt AI in their digital transformation projects, thereby fundamentally changing how value chains are configured and managed. Indeed, with businesses expected to be the main driver of AI adoption and investment over the next decade, the need for individuals that combine management skills and knowledge of advanced AI applications will continue to increase.

3.2. Similar Artificial Intelligence Programs Offered Elsewhere

In recent years, several top business schools in North America and Europe have introduced master's-level programs for the emerging field of AI. While some have a similar positioning as the proposed Schulich Master of Management of AI, others emphasize technological training rather than management skills. In Ontario Queen's University's Smith School of Business has launched a master-level program in the Management of AI (see Appendix D). However, the proposed MMAI program is different from existing programs by focusing equally on the managerial and the technical training of the student.

The Queen's University's Master of Management in Artificial Intelligence program takes 12 months to complete, and it limits its AI technology training to Data Science and Business analytics applications. The Schulich MMAI covers a much wider range of AI-related techniques. While a more limited focus on techniques makes sense for the Queen's program, which aspires to help graduates obtain decision support positions in the private and public sector, the Schulich program aspires to prepare students for a much wider range of jobs in all functional areas of the organization. In addition to data science and business analytics, Schulich MMAI students obtain knowledge in deep learning, numerical analysis, visualization and other advanced AI applications. Therefore, we do not consider the Queen's program as a direct competitor to the proposed Schulich MMAI. Indeed, the Queen's MMAI much more closely resembles the Schulich Master of Business Analytics, which also has a strong focus on data science and analytics methods, such as forecasting and decision modelling, while lacking training in advanced AI techniques.

In the US, the schools with the most similar programs to the MMAI are David Eccles School of Business at the University of Utah, Rutgers University Business School, University of Maryland's Robert H. Smith School of Business, and New York University's Stern School of Business (for details on the similarities with, and differences between, their respective programs and the proposed MMAI see Appendix D).

In sum, the most significant differentiator of the MMAI is the deliberate combination of its strong focus on developing management skills and its provision of significant training in a broad range of AI-related technologies. The culmination of this blend of management and technology training is the 2-term integrative consulting project. Our most immediate competitor, the Smith School of Business program, does not offer such an immersive and extended experiential learning component. In addition, while a few of the very best programs in the US offer a similar level of experimental and integrative learning, most of the US-based programs and none of the Canadian programs do.

3.3. The Need for Artificial Intelligence Programs

Over the past two decades, the AI industry has undergone a period of significant, if not revolutionary, expansion. Through the rapid proliferation of the Internet and other digital technologies, AI researchers now have an unparalleled level of data on all processes and operations of the organization as well as on consumers and markets. Furthermore, organizations and managers are looking to find ever new ways of gathering, analyzing and utilizing data often in real-time.

This rapid technological change has created growth and new job opportunities in the Management of Artificial Intelligence field. The Canadian government's Occupational Projection System predicts robust job growth for computer and information systems managers (see NOS Code 0213). Indeed, recognizing the looming gap between supply and demand, the province of Ontario aggressively pursues plans to increase the number of graduates in (AI)-related master programs over the next few years. The Vector Institute and its public and private partners will play a major role in meeting the demand for AI-talent. Jordan Jacobs, Co-founder & Member of the Vector Institute Board of Directors states: "An informal survey of companies in Toronto and the surrounding area found that local companies want to hire thousands of machine learning PhDs and master's graduates in the next five years. This number is far greater than the number of graduates per year in all of Canada and that helped to validate the idea to create the Vector Institute." The MMAI program will train such graduates and thereby help fill the gap between supply and demand of AI-related skills.

Further evidence for the need of IT-talent in general and AI-trained graduates in particular is the fact that the average hourly wage for AI-related jobs grew faster than the overall average wage growth. A lack of supply of qualified experts drives up wages and salaries. Over the 2014-2016 period, employment in AI increased faster than the average of all occupations. For Computer and information systems managers, over the period 2017-2026, new job openings (arising from expansion demand and replacement demand) are expected to total 32,500. In short, demand for AI-trained managers will be high.¹

¹ See Marr, B. (2018, June 25). "The AI Skills Crisis And How To Close The Gap." Access online at <<https://www.forbes.com/sites/bernardmarr/2018/06/25/the-ai-skills-crisis-and-how-to-close-the-gap/#22cdbc4931f3>>

4. Program Content and Curriculum

4.1. Program Requirements and Courses

The MMAI will require the completion of fourteen required courses, totaling 45 credits over three terms of full-time study. Students will also be required to complete a mandatory pre-start program. Figure 1 below presents an overview of the program structure.

The pre-start program will consist of the satisfactory completion of online course modules in Calculus, Computer Science, and Statistics offered by Udemy. The program commits to covering the Udemy fees for the required modules. The requirement for any or all Udemy modules may be waived if the student has taken subject courses in their previous studies as verified by their official transcripts. Students will also take a 3-day pre-start business fundamentals bootcamp in Marketing, Accounting and Finance.

The proposed coursework includes a real-world 6.00-credit capstone project called the Artificial Intelligence Consulting Project (AICP) that spans two terms (roughly 8 months in duration). During the AICP, students will solve a significant business problem by applying pertinent management techniques and Artificial Intelligence approaches. While much of the work during the AICP will happen at the new Schulich Deloitte Cognitive Analytics and Visualization Lab, students will also spend time at the client site (i.e., businesses, social sector and government organizations), interacting with various stakeholders including line managers, technicians, customers and suppliers.

All general program requirements currently in force for Schulich’s 3-term master’s degrees (including promotion and graduation requirements) will apply to this program as well. A copy of the handbook can be found at schulich.yorku.ca/graduate-handbook.

Figure 1. Master of Management in Artificial Intelligence Program Structure

| Master of Management in Artificial Intelligence (MMAI) | | | |
|---|--|--|---|
| Pre-Program | Term 1 (Fall) | Term 2 (Winter) | Term 3 (Summer) |
| Business Foundations Bootcamp | SB/MMAI 5000 3.00* Artificial Intelligence Fundamentals | SB/MMAI 5040 3.00* Business Applications of Artificial Intelligence I | SB/MMAI 5090 3.00* Business Applications of Artificial Intelligence II |

| | | | |
|---------------------------------------|--|---|--|
| Online Course: Calculus | SB/MGMT 6300 3.00 Case Analysis and Presentation Skills | SB/MBAN 5140 3.00 Visual Analytics and Modelling | SB/MMAI 5500 3.00* Applications of Neural Networks & Deep Learning in Business |
| Online Course: Statistics | SB/MMAI 5100 3.00* Database Fundamentals | SB/MMAI 5300 3.00* Numerical Analysis | SB/MMAI 5400 3.00* Natural Language Processing |
| Online Course: Computer Science | SB/MMAI 5200 3.00* Algorithms for Business Analysis | SB/ORGS 6350 3.00 Managing Change | SB/ORGS 6500 3.00 Interpersonal Managerial Skills |
| | GS/PHIL 5340 3.00 Ethics of AI | SB/MMAI 6050** Consulting Project 1 | SB/MMAI 6050** Consulting Project 2 |

* = New Course

** = MMAI 6050 6.00 spans Terms 2 and 3.

4.2. Courses

The program consisting of 14 required courses will run over three consecutive terms starting in September (see Figure 1; course descriptions are provided in **Appendix B**).

Of the fourteen required courses, four are existing masters-level courses. The other ten courses are unique to the Master of Management in Artificial Intelligence. The Ethics of AI course (GS/PHIL 5340) was developed especially for the MMAI program by the Philosophy department at York under the leadership of Canada Research Chair professor Regina Rini.

The courses will provide students with essential business knowledge and skills in the first term, including business communication and teamwork, basic artificial intelligence, and essential research and analytics skills. In the Winter and Summer terms, students will gain more advanced and specific knowledge in artificial intelligence as they study topics such as visualization, conversational systems, autonomous agents, natural language processing, big data, and deep learning. In addition, students will acquire problem-oriented management skills in the Winter and Summer terms as part of the consulting project and the course Business Applications of AI II.

Course scheduling was carefully considered in the design of the program. Courses that teach students fundamentals of artificial intelligence and analytics are taught in the first two terms. The program contains an experiential Artificial Intelligence consulting project (AICP) that spans terms 2 and 3. In term 2, students will define the projects with their clients, collect and analyze relevant qualitative and quantitative data, and develop management-driven Artificial Intelligence solutions to meet concrete business needs. In term 3 the student teams will implement their solutions, thus managing an entire Artificial Intelligence project from planning to

implementation.

The coursework that students complete before and during the AICP will enable them to choose from and apply appropriate artificial intelligence and management methods. Therefore, the consulting project will provide students with a truly integrative learning experience that offers both unique insights into the challenges and opportunities of creating an AI-driven business solution and a more confident entry into the workplace.

Students must enroll as full-time students. The total program can be completed in one year (3 terms). Students must complete the program within four years of entering.

4.3. Course Level

All courses are at the graduate level.

4.4. Program Overview

A program overview is provided in **Appendix A**.

5. Program Learning Outcomes and Assessment

5.1. Learning Outcomes

The MMAI program's learning outcomes were developed through extensive discussion with Schulich faculty members, industry experts, and graduates of the Schulich School of Business who currently work in related positions. Complete details on the expected learning outcomes are enclosed in **Appendix A**. **Appendix C** offers a detailed curriculum map that indicates which courses support a specific learning outcome. Importantly, the program level learning outcomes have been mapped against the Vector Institute's 1000AIMs guidelines for Complementary AI-related Master's Programs².

² <https://vectorinstitute.ai/wp-content/uploads/2018/04/1000aims-guidance-and-appendices-9apr18.pdf>

5.2. Program Learning Outcomes:

**Schulich School of Business
Master of Management in Artificial Intelligence (MMAI)
Program-Level Learning Outcomes**

Graduates of the MMAI Program are able to:

1. Core Business AI Understanding

1.1 Describe the key components of the artificial intelligence (AI) field, including search heuristics, knowledge representation, automated planning, agent-based systems, machine and deep learning, and probabilistic reasoning

1.2 Connect key AI components to the cornerstones of modern business management

2. Critical Thinking and AI Applications

2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization and visualizations

2.2 Design, implement, evaluate, and refine AI technologies for solving business problems

2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models

2.4 Apply strategic thinking skills for managerial decision making

3. Professional Communication

3.1 Deliver a clear, effective and engaging oral presentation appropriate for both technical and non-technical audiences

3.2 Prepare a clear, effective and engaging written report appropriate for both technical and non-technical audiences

3.3 Apply appropriate strategies to work effectively in interdisciplinary teams

4. Ethical Behaviour & Social Responsibility

4.1 Identify the ethical and societal implications of AI and its applications in business

4.2 Describe, analyze, and devise solutions for ethical and social issues that arise in the application of AI in business

5.3. Achieving the Program Learning Outcomes

Based on many (and always ongoing) conversations with our key stakeholders, such as practitioners, consultants, researchers, students and alumni, there is a substantial and ever-growing need for individuals that can take a business problem and manage all the processes required to develop an AI-driven solution to the problem. The skill set required by such an individual can therefore not be limited to cutting edge knowledge of AI technologies. Rather, the individual that businesses, government organizations and the social sector will need combines technology know-how with the skill set of a manager. Therefore, this program aspires to teach both the ability to design, evaluate, refine and implement practical AI technologies and solutions in a business context and the ability to manage a team, communicate effectively with business clients and demonstrate the highest ethical standards in business.

The Master of Management in Artificial Intelligence program has been designed to help students achieve both of these objectives with 18 credits dedicated to AI techniques and up to 27 credits allocated for the acquisition of AI management skills.

To achieve the proposed learning outcomes, the MMAI program has put a strong emphasis on experiential learning. Throughout the program, project-orientated teaching will be used to convey key technological components for AI applications such as machine learning as well as managerial capabilities ranging from presentation skills to strategic thinking and teamwork (e.g., MGMT 6300 Case Analysis and Presentation Skills).

The critical hands-on experience of a live project will be delivered via the AICP, where students are required to manage an entire cycle of preparing, applying and evaluating AI-based solutions to an organizational problem. Students work with businesses, non-profit and governmental organizations as well as entrepreneurial start-ups.

5.4. Assessment of Learning Outcomes

The grading and assessment process will be that used in other Schulich master's programs. Overall course grades will be based on the student's performance on the various elements of the course, including written assignments, case analyses, team work, presentations, examinations (mid-term tests and final examinations), and their contribution to class participation and learning.

Assignments, exercises or exams will also serve to assess the achievement of the learning outcomes. The program task force, the AD Academic and Academic Affairs Officer have worked together to map each learning outcome onto an assessment objective in a course delivered in the program. Please see the program's curriculum map in **Appendix C** for courses in which learning outcomes will be assessed.

The program has established a detailed assurance of learning (AoL) plan for the purposes of demonstrating and documenting students' performance levels with respect to the program's expected learning outcomes and DLEs. Each program-level learning outcome will be measured by an individually completed final assessment embedded in particular courses throughout the curriculum (see a list of final assessments in Appendix C). Student performance on these final assessments will be assessed against pre-established performance benchmarks, conveyed through the use of rubrics where appropriate. Certain rubrics, such as those designed to measure

'soft-skills'-related outcomes (e.g., presentation, reflection and teamwork skills) will be implemented program-wide to provide a consistent definition of program-level expectations as well as a well-scaffolded, formative approach to the development and measurement of core skills throughout the curriculum. A sample program-wide rubric for the assessment of presentation and teamwork skills (Outcome 3.3) is included in Appendix C.

Documentation of students' performance levels with regard to learning outcomes will be performed through Schulich's new learning management system, Canvas. This system offers robust learning outcome functionality in which outcomes can be set and aligned at both the course and program levels, and assessments can be aligned to outcomes through the use of course-specific or program-wide grading rubrics. The grading of student work in Canvas results in the automatic collection and compilation of data on student progress and allows for the tracking and reporting of performance levels to support the enhancement of curriculum and teaching, the identification of at-risk students, and reporting requirements for accreditation processes. The performance data will serve as the basis of the program's assurance of learning plan, enable evidence-based decision-making with regards to the identification of gaps in student performance in relation to the expected learning outcomes and enable the 'closing of the loop' on its curricular improvement initiatives undertaken to address these gaps.

5.5. Normal Program Length

The normal program length is three terms of full-time study, as indicated by the program structure in Figure 1. A course load of five courses per term is typical for all full-time students in Schulich masters' programs and is achievable for the vast majority of students. The course load, by design, aligns with similar professional master programs in the Schulich School of Business.

5.6. Delivery Modes

The program is in-person and course-based. The nature of the coursework varies, depending on the expected learning outcomes for each course. Students will engage in various types of experiential learning throughout the program, including case analysis, laboratory exercises, team work, working with technologies and data sets, as well as outreach and assistance to external organizations. The program also includes a two-term, community-based AI consulting project that helps students integrate their newly acquired technical and managerial skills in a real-world setting.

6. Admission Requirements

6.1. Program Admission Requirements

The minimum admission requirements are as follows:

- An undergraduate degree from a recognized postsecondary institution with a

- minimum B+ average in the last two full years (or equivalent) of academic work.
- Work Experience is not required, but internships or prior work experience is recommended.
- Graduate Management Admission Test (GMAT) or Graduate Record Examination (GRE)
 - Acceptable scores on all measures of the GMAT or GRE
 - To send your scores for these tests to us please use the following codes: GMAT code Z75-X8-87 or GRE code 5697
- Proof of English language proficiency if prior studies were not completed in English: TOEFL (iBT): 100 with minimum component scores of 23 or IELTS: 7.0 overall with minimum component scores of 6.5.
- A supplementary application form that shows strong evidence of leadership ability.
- Two letters of recommendation. It is recommended that one of these should be from a professor.

6.2. Alternative Requirements

N/A.

7. Resources

7.1. Areas of Faculty Strength and Expertise

One of Schulich's greatest strengths is the wide breadth of knowledge and experience of its faculty, which includes specialists in all areas of management in every type of organization as well as those who are experienced in the field of management of artificial intelligence.

The Schulich School of business is one of the very few business schools that has in-house experts in areas such as data governance and engineering, knowledge discovery, information retrieval, intelligent agent, managerial strategy, sustainability, ethics, and business and the environment, which facilitate a wide range of the curriculum components, such as database fundamentals, numerical analysis, visual analytics and modeling, machine learning, and natural language processing.

The resources for this program will largely be drawn from the resource base of the Schulich School (see Appendix E). Most courses will be taught by faculty members of the Operations Management and Information Systems (OMIS) area (tenure stream and contract), who possess expertise in general management as well as artificial intelligence. OMIS members also teach in Schulich's other masters programs and are responsible for teaching and supervising OMIS PhD students. In addition, the program will be enriched by experts in the ethics of AI from the Philosophy Department at York University, who designed and will teach a unique Ethics of AI course.

7.2. Role of Retired and Contract Instructors

Contract instructors play an essential role in the Schulich School of Business. All our contract instructors are highly experienced professionals and recognized experts in their respective fields of practice. These instructors bring real-world experience into the classroom to enrich lectures,

case analyses, assignments, projects, presentations, and students' performance in the "real world" of management.

Contract instructors will be employed where advisable, likely predominantly from the pool of qualified instructors already teaching at Schulich. As expert in their fields of specialization, such as machine learning, natural language processing and business applications of AI, contract instructors are very good at imparting practice-rich knowledge, which is in line with the goal of this master program. Other reasons for employing part-time instructors could be sabbatical coverage.

Retired professors also are valuable teaching resources due to their long experience and insight, but they are not expected to take a significant teaching role.

7.3. Laboratory Facilities/Equipment

The program will make use of the brand new Schulich Deloitte Cognitive Analytics and Visualization Lab, which stems from the partnership between the Schulich School of Business and Deloitte, a global leader in the field of business analytics and AI. The lab is supported by leading data scientist Hjalmar Turesson to foster advances in the visualization and interpretation of big data. The new lab and position have been established as part of a joint commitment to nurturing tomorrow's leading talent in the field and to elevate data analytics in Canada. The Lab is housed within Schulich's future Centre of Excellence in Business Analytics, one of several Centres of Excellence located in the School's new \$50-million Rob and Cheryl McEwen Graduate Study & Research Building, which opened in November 2018. The approximately 800-square-foot lab supports teaching and research goals, as well as explores advances in predictive analytics, natural language processing, machine learning, analytics design and visualization, and data-based story-telling.

MMAI students will use the lab to complete the AI Consulting Project, the program's capstone integrative course in which students undertake a comprehensive AI-related project for an organization (the "client" site). Over the course of eight months, real client data will be ingested into the lab platform, and students will perform data cleansing, verification and QA, and uncover insights using advanced analytics methods and visualization tools. The lab also brings the challenges faced by real companies (sponsor organizations) into the MMAI classroom, delivering deep insights and innovative ideas to drive business forward through advanced analytics, AI and visualization solutions. Using predictive and prescriptive advanced analytics methods, actionable insights can be derived from these data to equip organizations with a unique competitive advantage. The lab also combines statistical methods, computational intelligence, decision-making enabled by machine learning, and traditional symbolic AI to maximize AI's impact on analytical initiatives. More information on the Schulich Deloitte lab can be found at <https://dschulichlab.ai/how-it-works/>.

7.4. Space

Given the expected initial size of the program, space constraints are not an issue. The program will be housed in the newly constructed Rob and Cheryl McEwen Graduate Study & Research Building, which added 3 large classrooms and 4 seminar rooms to the number of existing classrooms already available. The Deloitte lab is situated adjacent to these classrooms as are 8 small group breakout rooms where teams can prepare their group assignments. With the addition of the new building, space will not be a concern for the program for the foreseeable future.

7.5. Support Services

The primary support services will be the library, information technology, career services and student and enrolment services, all of which are already in existence at Schulich and serve its other 11-degree programs. We also anticipate the possibility of needing one additional career advisor and an additional academic recruiter. These resources may be shared with the Master of Business Analytics (MBAN). The program will also rely on the strength of its Advisory Board Network and professional network of faculty members. Combined these networks bring together a substantial set of companies who will deliver high quality real-world AI-projects to the program for the AICP course. A designated support person responsible for growing and managing corporate relations will also be added to help ensure the strong supply of projects.

7.6. Financial Support and Supervisory Capacity

As this is not a research-based program, no special financial support will be provided other than the financial aid and scholarships that are generally available to Schulich masters-level students. Similarly, there is no need for research supervisors.

7.7. Enrolment Projections

We expect that the first cohort (in Fall 2019) will attract 25 students. First year enrolment will be capped at 50 students. This enrolment target is reasonable and achievable, as evidenced by the success of Schulich's other direct-entry master's programs (e.g., the Master of Management started with an inaugural class of 50 students in Fall 2016 and the Master of Marketing drew a class of 53 in its first year). The expected steady-state maximum enrolment target is one full class (up to 55 students), with a potential to add a second cohort over time.

7.8. Support Statements and Consultations

Please see the Dean's resource statement (**Appendix F**) and the library statement (**Appendix G**). The proponents have consulted extensively with Schulich faculty. In addition, the Schulich AD Academic has undertaken extensive consultation with the faculty of science and with the Lassonde School of Engineering. Both faculties have provided letters of support of the proposed program (see below). In addition, the Schulich AD Academic has integrated feedback from FGS APPC and the external review process. This section will be updated as consultations progress.

Appendix A

Master of Management in Artificial Intelligence (MMAI) Program Overview

Program Overview

The proposed Master of Management in Artificial Intelligence (MMAI) program is designed to prepare individuals to seek and obtain meaningful employment in artificial intelligence (AI)-related management positions, whether in private, public or non-profit organizations.

AI-related fields include, but are not limited to: data science, machine learning, visualizations, natural language understanding, intelligent robotics, knowledge representation, reasoning and management, intelligent agents, human computer interfaces, and recommendation systems.

The MMAI addresses a growing need in post-graduate management education for programs that train students in the task of designing, evaluating, refining and implementing practical AI-related solutions and technologies. The objective of the Master of Management in AI (MMAI) is to produce such graduates. The proposed Schulich MMAI program is not based on any existing Master of Management in Artificial Intelligence. Rather, the program will be designed from the ground up. Program-level learning outcomes (see below) have been developed based on input from leading academics in the field of management and AI as well as potential employers from the private sector, government and the non-profit and social sectors. Curriculum structure and course contents have been developed to achieve these learning outcomes ensuring that our MMAI students acquire the knowledge and skills required to succeed as managers in business and non-for-profit organizations or as entrepreneurs. The MMAI's program structure, which includes a unique 2-term integrative consulting project, will ensure that the program is highly differentiated from competing program (see section 3.2 below for details on program differentiation).

In addition to meeting the quality standards of the Schulich School of Business, York University and the province of Ontario, the MMAI has been designed to fulfill the standards set out by the Vector Institute (Vector) under the heading "1000AIMs." Vector's 1000AIMs initiative was established to support the province of Ontario's goal to produce 1000 graduates annually in the field of AI within five years.

The MMAI is a professional degree program in the management of artificial intelligence. The degree focuses on strategic thinking, tactical decision making, design techniques and ethics in AI. The objective is to produce well-rounded managers who have the potential to become leaders in AI-management.

The program will achieve these objectives over the course of three terms and the completion of 45 credits. The program is structured to facilitate the acquisition of AI and management knowledge and skills over these three terms. A key component of the program is the integration of the acquired knowledge through a capstone community-involved experiential learning project (the so-called AI Consulting Project, or AICP). This project will take place during the 2nd and 3rd terms. During the AICP students will make extensive use of the newly developed Schulich Deloitte Visual Cognitive Analytics Lab.

Schulich School of Business
Master of Management in Artificial Intelligence (MMAI)
Program-Level Learning Outcomes

1. Core Business AI Understanding

1.1 Describe the key components of the artificial intelligence (AI) field, including search heuristics, knowledge representation, automated planning, agent-based systems, machine and deep learning, and probabilistic reasoning

1.2 Connect key AI components to the cornerstones of modern business management

2. Critical Thinking and AI Applications

2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization and visualizations

2.2 Design, implement, evaluate, and refine AI technologies for solving business problems

2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models

2.4 Apply strategic thinking skills for managerial decision making

3. Professional Communication

3.1 Deliver a clear, effective and engaging oral presentation appropriate for both technical and non-technical audiences

3.2 Prepare a clear, effective and engaging written report appropriate for both technical and non-technical audiences

3.3 Apply appropriate strategies to work effectively in interdisciplinary teams

4. Ethical Behaviour & Social Responsibility

4.1 Identify the ethical and societal implications of AI and its applications in business

4.2 Describe, analyze, and devise appropriate solutions for ethical and social issues that arise in the application of AI in business

Admission Requirements

The minimum admission requirements are as follows:

- An undergraduate degree from a recognized postsecondary institution with a minimum B+ average in the last two full years (or equivalent) of academic work.
- Work Experience is not required, but internships or prior work experience is recommended.
- Proof of English language proficiency if prior studies were not completed in English: TOEFL (iBT): 100 with minimum component scores of 23 or IELTS: 7.0 overall with minimum component scores of 6.5.
- A supplementary application form that shows strong evidence of leadership ability.
- Two letters of recommendation, at least one of which should be from a professor.

Appendix B

Master of Management in Artificial Intelligence (MMAI) Course Summaries

Courses are arranged into three groups. See Figure 1. This is the sequence in which full-time and part-time students are expected to take these courses. For a full-time student, each group corresponds to a full term of study. A part-time student may take two of the courses per term from each group depending on personal schedules and course availability.

1. Required Courses (45 credits)

ADVANCE PREPARATION (required by all confirmed entrants)

Prior to the commencement of studies, the satisfactory completion of a 3-day business foundations bootcamp program, focused on Marketing, Finance and Accounting, as well as a series of online courses in the following areas:

- Calculus
- Statistics
- Computer Science

Term 1 Courses

SB/MMAI 5000 3.00 Artificial Intelligence Fundamentals

This course will introduce students to the field of artificial intelligence, with a focus on AI-driven business applications. The course also provides a historical perspective tracing the emergence of basic terminologies and concepts of contemporary AI. In addition, students will be introduced to key artificial intelligence techniques including knowledge representation and symbolic reasoning, biologically inspired approaches to artificial intelligence, supervised, unsupervised and reinforcement learning, multi-agent systems, planning and natural language processing. This course is a pre-requisite for MMAI 5040.

SB/MGMT 6300 3.00 Case Analysis and Presentation Skills

This course is designed to give students the opportunity to practice and develop their analytical thinking and presentation skills. The key objective of the course is to train students to participate successfully in national and international case competitions. A secondary objective is to prepare students to interview successfully for management consulting positions. MMAI students will analyze cases and deliver presentations.

SB/MMAI 5100 3.00 Database Fundamentals

Database Management Systems are computer-based systems used by organizations to manage the vast amount of data that accompany daily operations, support data analysis, and enable intelligent decision making. This course provides an applied introduction to database management systems and their use in the business environment. The course covers the fundamentals of database analysis and design. It also provides a hands-on experience in designing and building databases using Oracle or MySQL Database. Specific topics covered include the role of database systems, the relational database model, and entity-relationship diagrams, as well as applied skills such as formulating queries, designing forms, and creating reports in SQL (Structured Query Language). At the end of the course students will be able to design and build a fully operational database to support business decision making and operations.

SB/MMAI 5200 3.00 Algorithms for Business Analysis

The course covers main approaches to design and analysis of algorithms used in business contexts, including important algorithms and data structures, and results in complexity and computability. The main contents are: review of algorithm analysis such as search in ordered array, binary insertion sort; an introduction to divide and conquer algorithms; graphs; and applications of greedy algorithms. These applications will be covered in business context and will be linked to specific business applications. This course is a pre-requisite for MMAI 5300.

GS/PHIL 5340 3.00 Ethics of AI

This course provides an overview of social and ethical issues arising from emerging Artificial Intelligence technology. The course will explore both existing and future technology applications, with a focus on learning to recognize and anticipate novel ethical challenges. By practicing ethical analysis in written and oral presentation, students will develop future-oriented skills applicable to technologies not yet invented. Topics, that are currently relevant or in the near future, will include algorithmic transparency and bias, big data surveillance and privacy, autonomous robotics in transport and warfare, economic and legal consequences of labour automation, use of robots as caregivers, and the effects of AI-human interaction on human ethical behavior. Topics, that are relevant in the long term, will include theoretical issues such as whether AI can or should ever make independent ethical decisions, whether AI might ever be entitled to moral rights of its own, and how humanity can contain the risks of 'superintelligent' future AI. The course will also consider whether the tech industry needs its own set of AI-related professional ethics (modeled on medical, business, and engineering ethics). What are the distinctive social responsibilities of AI companies and research institutions? What are the obligations of individual AI professionals?

Term 2 Courses

SB/MMAI 5040 3.00 Business Applications of Artificial Intelligence I

This course builds on the introductory perspective provided by MMAI 5000, which emphasizes practical business applications of artificial intelligence rather than the conventional focus on the derivation of methods from first principles. The emphasis in this course will be on automation and autonomous cyber-physical system applications of artificial intelligence in business contexts. Students gain a holistic view of artificial intelligence as applied to practical business

contexts through a combination of case studies (in and out of class) as well as in-class lab-style technical explorations. These are complimented by assignments and two projects throughout the course. Furthermore, students gain practical knowledge of the managerial applications of AI across several business contexts from guest speakers and detailed business case studies. This course is a pre-requisite for xxxx and MMAI 5400.

SB/MBAN 5140 3.00 Visual Analytics and Modelling

This course is an introduction to the theories of visual communication design applied in data visualization and visual analytics. Students become familiar with data-driven decision-making workflows and theories and practices of storytelling. The course focuses on visual design principles, data structures, taxonomy of data visualization models and weekly tutorials using the Tableau software.

SB/MMAI 5300 3.00 Numerical Analysis

Numerical analysis is concerned with finding numerical solutions to problems for which analytical solutions either do not exist or are not readily or cheaply obtainable. This course provides an introduction to the subject, focusing on the three core topics of iteration, interpolation and quadrature. The module starts with “interpolation schemes,” methods for approximating functions by polynomials, and “quadrature schemes,” numerical methods for approximating integrals, will then be explored in turn. The second half of the module looks at solving systems of linear and nonlinear equations via iterative techniques. In the case of linear systems, examples will be drawn from the numerical solution of differential equations. Students will learn about practical and theoretical aspects of all the algorithms. Insight into the algorithms will be given through illustrations, but the course does not require any programming.

SB/ORGS 6350 3.00 Managing Change

As the environment of many business and nonprofit organizations becomes increasingly complex and unstable, it is imperative that managers be able to create a climate of flexibility and adaptability in their operations. Organizations must be able to undertake major change without destructive side effects to be truly successful. This course surveys the major methods available to the modern manager for effectively managing the process of change and creating a general climate in which needed changes are sought and welcomed throughout the organization. The course emphasizes case studies and the discussion of alternative change management models.

SB/MMAI 6050 6.00 AI Consulting Project I

The AI Consulting Project is the capstone integrative course of the MMAI program. It will allow students to deepen their understanding of the subject matter and methodologies, as well as provide an opportunity for hands-on, problem-driven research and application. It is an intensive, 2-term course where groups of 4 MMAI students undertake a comprehensive artificial intelligence (AI) project of an organization (“client site”) and provide business insights to enhance the site’s future success. At the conclusion of the AI consulting project students submit and present their final work to a panel of at least two experts, including the course director, and also to the client site.

Term 3 Courses

SB/MMAI 5090 3.00 Business Applications of Artificial Intelligence II

This course bridges the theoretical foundation and the business applications of artificial intelligence technology. Through in-class lecturing and hands-on activities, students learn fundamentals of AI technology, formulate business problems in AI paradigm and Applications of AI in addressing business problems. AI applications are embedded in the infrastructure of many products and services, including search engines, medical diagnoses, speech recognition, robot control, web search, advertising and so on so forth. This course provides a broad overview of applying modern artificial intelligence in business. Students learn how machines can engage in problem solving, reasoning, learning, and interaction. Students gain an appreciation and case-based experience of this dynamic field in the context of business problems. The class covers up-to-date AI applications in various domains such as Recommendation Systems, FinTech, Social Network Analytics, Sentiment Analysis etc.

SB/MMAI 5500 3.00 Applications of Neural Networks and Deep Learning in Business

This course covers the theory and practice of deep learning. Topics covered include training methods and loss functions, automatic differentiation and backpropagation, network architectures for different learning problems, validation, model selection and software tools.

SB/MMAI 5400 3.00 Natural Language Processing

There has been an increasing demand for better retrieval, processing, and analysis of textual information in modern society in recent years due to the availability of a huge and ever-growing amount of textual data from both inside organizations and the Internet. Well known examples include web search engines (e.g., Google), document and content management systems, email filtering, social media sentiment analysis, automated question answering (e.g., IBM's Watson on Jeopardy!), natural language interfaces in games and mobile devices, and big data text analytics for business/competitive intelligence. Natural language processing (NLP), also known as computational linguistics, which aims to process and understand natural languages and text, is the driving force that makes these tasks and systems possible. This course focuses on the principles and technologies of statistical machine-learning-based NLP and their application in text analytics, including retrieval, extraction, recognition, and analysis of information from large textual collections. Prerequisite: MMAI 5040 3.00 Business Applications of Artificial Intelligence 1 and MMAI 5300 3.00 Numerical Analysis.

SB/ORGS 6500 3.00 Interpersonal Managerial Skills

Research demonstrates that people and their ability to work effectively together are critical success factors for organizations. This course focuses on specific personal and interpersonal skills for organizational (and professional) effectiveness. With an emphasis on experiential exercises, the course helps students develop skills such as communication; time, conflict and stress management; performance management; gaining influence; and self-awareness (including emotional intelligence).

SB/MMAI 6050 6.00 AI Consulting Project II

The AI Consulting Project is the capstone integrative course of the MMAI program. It will allow students to deepen their understanding of the subject matter and methodologies, as well as provide an opportunity for hands-on, problem-driven research and application. It is an intensive, 2-term course where groups of 4 MMAI students undertake a comprehensive artificial intelligence (AI) project of an organization (“client site”) and provide business insights to enhance the site’s future success. At the conclusion of the AI consulting project students submit and present their final work to a panel of at least two experts, including the course director, and also to the client site.

Appendix C

Master of Management in Artificial Intelligence (MMAI) Curriculum Map

Legend: I = Introduced, D = Developed, R = Reinforced, A = Assessed Individually for Achievement

| | TERM 1 | | | | | TERM 2 | | | | | TERM 3 | | | | |
|---|---|--|--|---|-------------------------------------|---|--|---|--|---|--|---|--|--|--|
| Program Level Goals & Learning Objectives: Graduates of the Master of Management in Artificial Intelligence program are able to ... | SB/MMAI 5000 Artificial Intelligence Fundamentals | SB/MGMT 6300 Case Analysis and Presentation Skills | SB/MMAI 5100 Database Fundamentals | SB/MMAI 5200 Algorithms for Business Analysis | GS/PHIL 5340 Ethics of AI | SB/MMAI 5040 Business Applications of Artificial Intelligence I | SB/MMAI 5140 Visual Analytics and Modeling | SB/MMAI 5300 Numerical Analysis | SB/ORGS 6350 Managing Change | SB/MMAI 6050 Consulting Project 1 | SB/MMAI 5090 Business Applications of Artificial Intelligence II | SB/MMAI 5500 Appl. of N. Networks & Deep Learning in Business | SB/MMAI 5400 Natural Language Processing | SB/ORGS 6500 Interpersonal Managerial Skills | MMAI 6050 Consulting Project 2 |
| Goal 1: Core Business AI Understanding | | | | | | | | | | | | | | | |
| 1.1 Describe the key components of the artificial intelligence (AI) field. | I | | I | I | | D | R | D | | | A | D | R | | R |
| 1.2 Connect key AI components to the cornerstones of modern business management | I | | | D | | I | I | | | | A | R | | | |

| | TERM 1 | | | | | TERM 2 | | | | | TERM 3 | | | | |
|--|---|--|--|---|-------------------------------------|---|--|---|--|---|--|---|--|--|--|
| Program Level Goals & Learning Objectives: Graduates of the Master of Management in Artificial Intelligence program are able to ... | SB/MMAI 5000 Artificial Intelligence Fundamentals | SB/MGMT 6300 Case Analysis and Presentation Skills | SB/MMAI 5100 Database Fundamentals | SB/MMAI 5200 Algorithms for Business Analysis | GS/PHIL 5340 Ethics of AI | SB/MMAI 5040 Business Applications of Artificial Intelligence I | SB/MMAI 5140 Visual Analytics and Modeling | SB/MMAI 5300 Numerical Analysis | SB/ORGS 6350 Managing Change | SB/MMAI 6050 Consulting Project 1 | SB/MMAI 5090 Business Applications of Artificial Intelligence II | SB/MMAI 5500 Appl. of N. Networks & Deep Learning in Business | SB/MMAI 5400 Natural Language Processing | SB/ORGS 6500 Interpersonal Managerial Skills | MMAI 6050 Consulting Project 2 |
| Goal 2: Critical Thinking and AI Applications | | | | | | | | | | | | | | | |
| 2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization & visualizations | I | | I | I | | D | | | | | A | | | | R |
| 2.2 Design, implement, evaluate, and refine AI technologies for solving business problems | I | | | | | D | | | | | | A | R | | R |

| | TERM 1 | | | | | TERM 2 | | | | | TERM 3 | | | | |
|--|---|--|--|---|-------------------------------------|---|--|---|--|---|--|---|--|--|--|
| <p>Program Level Goals & Learning Objectives:</p> <p>Graduates of the Master of Management in Artificial Intelligence program are able to ...</p> | SB/MMAI 5000 Artificial Intelligence Fundamentals | SB/MGMT 6300 Case Analysis and Presentation Skills | SB/MMAI 5100 Database Fundamentals | SB/MMAI 5200 Algorithms for Business Analysis | GS/PHIL 5340 Ethics of AI | SB/MMAI 5040 Business Applications of Artificial Intelligence I | SB/MMAI 5140 Visual Analytics and Modeling | SB/MMAI 5300 Numerical Analysis | SB/ORGS 6350 Managing Change | SB/MMAI 6050 Consulting Project 1 | SB/MMAI 5090 Business Applications of Artificial Intelligence II | SB/MMAI 5500 Appl. of N. Networks & Deep Learning in Business | SB/MMAI 5400 Natural Language Processing | SB/ORGS 6500 Interpersonal Managerial Skills | MMAI 6050 Consulting Project 2 |
| 2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models | I | | | | D | D | | | | | R | R | A | | |
| 2.4 Apply strategic thinking skills for managerial decision making | | I | | | I | | | R | | | R | | | R | A |
| Goal 3: Professional Communication | | | | | | | | | | | | | | | |
| 3.1 Deliver a clear, effective and engaging oral presentation on applied AI technologies appropriate for both technical | | I | | | D | | D | R | R | | | | | | A |

| | TERM 1 | | | | | TERM 2 | | | | | TERM 3 | | | | |
|---|---|--|--|---|-------------------------------------|---|--|---|--|---|--|---|--|--|--|
| Program Level Goals & Learning Objectives: Graduates of the Master of Management in Artificial Intelligence program are able to ... | SB/MMAI 5000 Artificial Intelligence Fundamentals | SB/MGMT 6300 Case Analysis and Presentation Skills | SB/MMAI 5100 Database Fundamentals | SB/MMAI 5200 Algorithms for Business Analysis | GS/PHIL 5340 Ethics of AI | SB/MMAI 5040 Business Applications of Artificial Intelligence I | SB/MMAI 5140 Visual Analytics and Modeling | SB/MMAI 5300 Numerical Analysis | SB/ORGS 6350 Managing Change | SB/MMAI 6050 Consulting Project 1 | SB/MMAI 5090 Business Applications of Artificial Intelligence II | SB/MMAI 5500 Appl. of N. Networks & Deep Learning in Business | SB/MMAI 5400 Natural Language Processing | SB/ORGS 6500 Interpersonal Managerial Skills | MMAI 6050 Consulting Project 2 |
| and non-technical audiences. | | | | | | | | | | | | | | | |
| 3.2 Prepare a clear, effective and engaging written report on applied AI technologies appropriate for both technical and non-technical audiences. | | I | | | D | | D | | | R | | | | | A |
| 3.3 Apply appropriate strategies to work effectively in interdisciplinary teams. | | I | | | I | D | | D | R | R | R | R | D | A | |
| Goal 4: Ethical Behaviour & Social Responsibility | | | | | | | | | | | | | | | |
| 4.1 identify the ethical and societal implications of AI and its applications in business | I | D | | | A | | | | | R | | | R | | R |

| | TERM 1 | | | | | TERM 2 | | | | | TERM 3 | | | | |
|---|---|--|--|---|-------------------------------------|---|--|---|--|---|--|---|--|--|--|
| Program Level Goals & Learning Objectives: Graduates of the Master of Management in Artificial Intelligence program are able to ... | SB/MMAI 5000 Artificial Intelligence Fundamentals | SB/MGMT 6300 Case Analysis and Presentation Skills | SB/MMAI 5100 Database Fundamentals | SB/MMAI 5200 Algorithms for Business Analysis | GS/PHIL 5340 Ethics of AI | SB/MMAI 5040 Business Applications of Artificial Intelligence I | SB/MMAI 5140 Visual Analytics and Modeling | SB/MMAI 5300 Numerical Analysis | SB/ORGS 6350 Managing Change | SB/MMAI 6050 Consulting Project 1 | SB/MMAI 5090 Business Applications of Artificial Intelligence II | SB/MMAI 5500 Appl. of N. Networks & Deep Learning in Business | SB/MMAI 5400 Natural Language Processing | SB/ORGS 6500 Interpersonal Managerial Skills | MMAI 6050 Consulting Project 2 |
| 4.2 Describe, analyze, and devise appropriate solutions for ethical and social issues that arise in the business application of AI in business. | | I | | | A | | | | | | | | | | |

Schulich School of Business
Master of Management in Artificial Intelligence (MMAI)
Program-Level Learning Outcomes & Assessments

| Learning Outcome | Course Assessed in | Assessment (Individually Completed) |
|--|--|--|
| Core Business AI Understanding | | |
| 1.1 Describe the key components of the artificial intelligence (AI) field, including search heuristics, knowledge representation, automated planning, agent-based systems, machine and deep learning, and probabilistic reasoning | SB/MMAI 5000 3.00 Artificial Intelligence Fundamentals | Final Exam |
| 1.2 Connect key AI components to the cornerstones of modern business management | SB/MMAI 5090 3.00 Business Applications of Artificial Intelligence II | Final Exam |
| Critical Thinking and AI Applications | | |
| 2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization and visualizations | SB/MMAI 5090 3.00 Business Applications of Artificial Intelligence II | Final Exam |
| 2.2 Design, implement, evaluate, and refine AI technologies for solving business problems | SB/MMAI 5040 3.00 Business Applications of Artificial Intelligence I | Final Exam |
| 2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models | SB/MMAI 5200 3.00 Algorithms for Business Analysis | Final Exam |
| 2.4 Apply strategic thinking skills for managerial decision making | SB/MMAI 5090 3.00 Business Applications of Artificial Intelligence II | Final Exam |
| Professional Communication | | |
| 3.1 Deliver a clear, effective and engaging oral presentation appropriate for both technical and non-technical audiences | SB/MGMT 6300 3.00 Case Analysis & Presentation Skills | Case Presentation |
| 3.2 Prepare a clear, effective and engaging written report appropriate for both technical and non-technical audiences | SB/MBAN 5040 3.00 Visual Analytics & Modelling | Project # 2 |

| | | |
|---|--|------------------------------|
| 3.3 Apply appropriate strategies to work effectively in interdisciplinary teams | SB/MMAI 6050 6.00 AI Consulting Project | Peer & Instructor Evaluation |
| Ethical Behaviour & Social Responsibility | | |
| 4.1 Identify the ethical and societal implications of AI and its applications in business | GS/PHIL 5340 3.00 Ethics of AI | Written Assignment |
| 4.2 Describe, analyze, and devise solutions for ethical and social issues that arise in the application of AI in business | GS/PHIL 5340 3.00 Ethics of AI | Written Assignment |

The program has established a detailed assurance of learning (AoL) plan for the purposes of demonstrating and documenting students' performance levels with respect to the program's expected learning outcomes and DLEs. Each program-level learning outcome will be measured by an individually completed final assessment embedded in particular courses throughout the curriculum (see curriculum map above). Student performance on these final assessments will be assessed against pre-established performance benchmarks, conveyed through the use of rubrics where appropriate. Certain rubrics, such as those designed to measure 'soft-skills'-related outcomes (e.g., presentation, reflection and teamwork skills) will be implemented program-wide to provide a consistent definition of program-level expectations as well as a well-scaffolded, formative approach to the development and measurement of core skills throughout the curriculum. A sample program-wide rubric for the assessment of presentation and teamwork skills (Outcome 3.3) is included below.

Documentation of students' performance levels with regard to learning outcomes will be performed through Schulich's new learning management system, Canvas. This system offers robust learning outcome functionality in which outcomes can be set and aligned at both the course and program levels, and assessments can be aligned to outcomes through the use of course-specific or program-wide grading rubrics. The grading of student work in Canvas results in the automatic collection and compilation of data on student progress and allows for the tracking and reporting of performance levels to support the enhancement of curriculum and teaching, the identification of at-risk students, and reporting requirements for accreditation processes. The performance data will serve as the basis of the program's assurance of learning plan, enable evidence-based decision-making with regards to the identification of gaps in student performance in relation to the expected learning outcomes and enable the 'closing of the loop' on its curricular improvement initiatives undertaken to address these gaps.

Schulich School of Business

Assessment Rubric for Presentation Skills Learning Outcomes

| | Core Competencies & Indicators | Unsatisfactory (D) | Below Expectations (C) | Meets Expectations (B) | Exceeds Expectations (A) |
|----|--|---|--|---|--|
| 1. | Organization of Ideas | | | | |
| | Introduction | Presentation lacks a clear or compelling introduction that orients the audience to the topic. Audience interest in the topic is not generated at the outset. | Introduction is at times unclear or unconvincing or does not orient the audience to the topic. Minimal audience interest in the topic is generated at the outset. | Presentation opens with a clear introduction that orients the audience to the topic and generates some interest from the outset. | Presentation opens with a clear, compelling, and engaging introduction that orients the audience and captures interest from the outset. |
| | Body | Does not structure arguments in a logical manner. Organization of ideas does not support understanding of the main argument. No connection between body, introduction or conclusion. | Structure of arguments often does not appear logical or well-reasoned. Organization of ideas contributes little to understanding of the main argument. Vague connection between body, introduction and conclusion. | Logical reasoning pattern is evident, resulting in an effective argument structure. Organization of ideas supports understanding of the main argument. Clear relationship between body, introduction and conclusion. | Logical reasoning pattern is both evident and compelling, enabling a highly effective argument structure. Organization of ideas strongly supports understanding of the main argument. Clear relationship between body, introduction and conclusion making it easy for the audience to follow. |
| | Conclusion | Presentation lacks a conclusion, or conclusion is vague, unclear or disconnected from key claims or evidence. | Conclusion is weak, poorly formulated, or poorly linked to the evidence or key claims. | Conclusion is clear and concise and is clearly linked to the evidence and key claims made throughout the presentation. | Meets expectations, plus conclusion is engaging and thoroughly explores the implications and significance of the topic. |
| 2. | Content & Quality of Ideas | | | | |
| | Main Argument | Presentation lacks a clear central message, or multiple inconsistent messages are conveyed throughout. | Central argument can be deduced but is not explicitly stated or reinforced. | Conveys a clear and consistent central message throughout the presentation. | Central message is compelling, precisely stated and appropriately repeated. |
| | Use of Supporting Evidence & Sources | Claims are supported by irrelevant or inappropriate evidence. Presentation lacks sources or sources used lack the appropriate range or quality. | Uses a few inappropriate facts or irrelevant, inaccurate, or unpersuasive ideas to support the main argument. Evidence provided is from a minimal range of sources or some sources are inappropriate or of poor quality. | Appropriate facts and relevant, accurate and persuasive ideas are used to support the main argument. Credible evidence provided from an appropriate range of quality sources. | Appropriate and highly relevant, accurate, and persuasive ideas are used to support the main argument. Credible evidence from a wide range of quality sources is provided; extensive research beyond standard or typical sources is demonstrated. |
| | Audience & Purpose | Content and components are inconsistent with audience and purpose. | Content and components at times lack relevance to audience and purpose. | Content and components are appropriate for audience and purpose. | Content and components are nuanced and expertly selected for audience and purpose. |
| | Originality & Creativity | Presentation is neither original nor creative. | Presentation is only minimally original or creative. | Presentation is generally original and/or creative. | Presentation is highly original and creative. |
| 3. | Body Language & Auditory Mechanics | | | | |
| | Eye- Contact, Volume, Articulation, Pace & Tone | Does not look at audience; reads notes and/or only looks at the instructor. Delivery is unnatural and/or unprepared. Volume is too soft to hear or distractingly loud. Articulation is poorly executed/unclear. Mumbles or runs words together. Pace is too fast or too slow. Tone is unprofessional and/or inappropriate for the audience and purpose. | Delivery is mechanical with occasional instances of natural delivery. Occasional eye contact with the audience. Some preparation evident but frequently reads from notes or slides. Volume is sometimes inaudible or inappropriately loud. Articulation is occasionally clear. Pace is inconsistent (at times too fast or too slow). Tone is sometimes unprofessional and/or inappropriate for the audience and purpose. | Delivery is natural and helps build rapport with the audience. Strong eye contact with the audience is maintained most of the time. Delivery is prepared (occasionally reads from notes or slides). Volume is consistently audible by the entire audience. Articulation is consistently clear. Pace is appropriate to facilitate audience understanding. Tone is generally professional and appropriate for the audience and purpose. | Delivery is natural and helps build engagement with the audience. Strong eye contact with the audience is maintained throughout the presentation. Delivery is thoroughly prepared (rarely reads from notes or slides). Volume is audible and varied to emphasize key points and enhance audience interest. Articulation is clear precise and engaging. Pace is natural and varied to emphasize key points and enhance audience interest. Tone is consistently engaging, professional and appropriate for the audience and purpose. |
| 4. | Use of Visuals Aids | | | | |
| | | Does not use visual aids, or uses inappropriate or distracting visual aids. | Uses visual aids that are sometimes distracting or undermine understanding of the presentation. | Uses visual aids that have a clear purpose and guide the audience throughout the presentation. | Uses visual aids that have a clear purpose, are thoughtful and enrich the presentation. |
| 5. | Time Management | | | | |
| | | Goes significantly over or under allotted time. Misses important points completely. | Struggles to deliver presentation in the allotted time (may rush at the end of the presentation). Spent too little or too much time on important points. | Delivers presentation in the allotted time. Sufficiently covers important points. | Meets expectations, plus devotes more or less time to components based on their relative importance. Demonstrates an understanding of how to modify timing based on unanticipated constraints. |
| 6. | Response to Audience Questions | | | | |
| | | Cannot answer audience questions | Answers some audience questions but not clearly or completely. | Encourages audience questions and answers most clearly and completely. | Encourages audience questions and answers all clearly and completely. |
| 7. | Coordination in Team Presentations | | | | |
| | | Not all members participate; team members do not have clearly defined roles and the team appears uncoordinated. | All team members participate, but not equally. Team members do not have clearly defined roles and/or the team often appears uncoordinated. | All team members participate for about the same length of time and are able to answer questions. The team is mostly coordinated but there are a few moments of doubt and/or imbalance. | All team members participate, answer questions, and contribute equally to the success of the presentation. The team appears highly coordinated with clearly defined roles. |

Schulich School of Business

Assessment Rubric for Teamwork Learning Outcomes

| | Core Competencies & Indicators | Unsatisfactory (D) | Below Expectations (C) | Meets Expectations (B) | Exceeds Expectations (A) |
|-----------|--|---|--|---|--|
| 1. | Interpersonal Communication | | | | |
| | Communicates respectfully with team members using effective tone and body language | Does not communicate with team members or does so disrespectfully | Communicates respectfully but does so inconsistently or to select members only | Communicates respectfully with all team members using effective tone & body language | Meets expectations plus encourages other team members to communicate respectfully |
| | Uses effective strategies to communicate with speakers of differing cultures, skills and preferences | Does not use strategies or uses ineffective strategies to communicate with speakers of differing cultures, skills and preferences | Attempts to use strategies but does so inconsistently or has to be supported by other team members | Consistently uses effective strategies to communicate with speakers of differing cultures, skills and preferences | Meets expectations plus supports team members in communicating with speakers of differing backgrounds, skills and preferences |
| | Contributes to establishing standards of performance and norms of practice, and adheres to them throughout the project, refining as needed | Does not contribute to standards or norms or establishes destructive standards and norms | Begins to informally identify standards and norms but they do not make advances in guiding the team | Contributes to standards and norms that guide the team and adheres to them throughout the project | Meets expectations plus respectfully holds team members accountable to standards and norms |
| | Conveys a constructive, inclusive, and motivating attitude about the team and its work | Conveys a negative attitude in a way that hinders the team | Attempts to convey a constructive, inclusive or motivating attitude but is inconsistent | Consistently conveys a constructive, inclusive and motivating attitude about the team and its work | Meets expectations plus encourages other team members to adopt a constructive, inclusive or motivating attitude |
| | Articulates the merits of alternative ideas from others and offers new and helpful suggestions that build on those ideas | Does not articulate the merits of alternative ideas, diminishes the ideas of others, offers no suggestions, or doesn't build on the ideas of others | Repeats suggestions made by others without incorporating any novel or useful ideas or rarely builds on the ideas of others | Recognizes and articulates the merits of alternative ideas and offers new suggestions that build on the ideas of others | Meets expectations plus synthesizes and refines the suggestions of others to offer helpful ideas that advance the work of the team |
| | Provides assistance to team members as needed or required | Does not assist team members or intervenes and disrupts the work of others | Assists some team members but ignores others or provides limited assistance | Consistently provides assistance to all team members as needed or required | Meets expectations plus provides support to team in finding ways to meet their individual obligations |
| 2. | Quality of Work | | | | |
| | Produces quality individual contributions that advance the work of the team | Does not produce work or work is not usable and must be redone by others | Quality of work is inconsistent; occasionally needs to be checked or redone by others to be acceptable | Quality of work is satisfactory; only minor improvements required | Meets expectations plus proactively helps team members who produce work that requires improvements |
| 3. | Conflict Resolution | | | | |
| | Identifies and effectively addresses conflict | Does not identify or address conflict or contributes to the escalation of conflict | Identifies conflict but makes little effort to address it or effort is ineffective | Identifies and effectively addresses conflict in the team until resolution is reached | Meets expectations plus consistently encourages an atmosphere of open dialogue and constructive argument |
| 4. | Organization | | | | |
| | Completes all assigned tasks by the established deadlines | Assigned tasks are not completed by the deadline or at all | Completes some tasks by the deadline; may sometimes require reminding or support from team | Completes all assigned tasks by the deadline | Completes all work in advance with enough time to improve quality before the deadline |
| | Attends team meetings regularly and on time | Does not attend team meetings or is often late or absent without notifying the team | Is sometimes late and/or absent; may notify team | Attends team meetings regularly and on time; consistently notifies team if late or absent | Meets expectations plus follows up with team to catch up on what was missed if absent |
| | Initiates and responds to team communication in a timely manner | Does not initiate or respond to team communication | Sometimes initiates and responds to team communication but communication may be delayed or unhelpful | Regularly initiates and responds to team communication in a timely manner | Meets expectations plus initiates for or follows up with other team members when necessary |
| 5. | Reflection & Self-Awareness | | | | |
| | Assesses how one's actions impact the team and adapts actions or outlook based on feedback or the needs of the team | Does not adapt actions or outlook based on the needs of the team or adapts detrimentally | Does not readily adapt actions or outlook; has to be prompted by others | Adapts actions and/or outlook based on the needs of the team | Meets expectations plus constructively helps others adapt |

**Mapping of Master Degree Level Expectations against
Master of Management in Artificial Intelligence (MMAI) Program Learning Outcomes**

| Master Degree Level Expectations | | MMAI Outcomes | |
|--------------------------------------|--|--|---|
| 1. Depth and breadth of knowledge | A systematic understanding of knowledge, including, where appropriate, relevant knowledge outside the field and/or discipline, and a critical awareness of current problems and/or new insights, much of which are at, or informed by, the forefront of their academic discipline, field of study, or area of professional practice. | 1. Core Business AI Understanding | <p>1.1 Describe the key components of the artificial intelligence (AI) field, including search heuristics, knowledge representation, automated planning, agent-based systems, machine and deep learning, and probabilistic reasoning</p> <p>1.2 Connect key AI components to the cornerstones of modern business management</p> |
| 2. Research and scholarship | <p>A conceptual understanding and methodological competence that:</p> <p>a) enables a working comprehension of how established techniques of research and inquiry are used to create and interpret knowledge in the discipline;</p> <p>b) enables a critical evaluation of current research and advanced research and scholarship in the discipline or area of professional competence; and</p> <p>c) enables a treatment of complex issues and judgments based on established principles and techniques; and,</p> <p>On the basis of that competence, has shown at least one of the following:</p> <p>a) development and support of a sustained argument in written form; or</p> <p>b) originality in the application of knowledge.</p> | 2. Critical Thinking and AI Applications | <p>2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization and visualizations</p> <p>2.2 Design, implement, evaluate, and refine AI technologies for solving business problems</p> <p>2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models</p> <p>2.4 Apply strategic thinking skills for managerial decision making</p> |
| 3. Level of application of knowledge | Competence in the research process by applying an existing body of knowledge in the critical analysis of a new question or of a specific problem or issue in a new setting. | | |
| 6. Awareness of limits of knowledge | Cognizance of the complexity of knowledge and of the potential contributions of other interpretations, methods, and disciplines. | | |
| 4. Professional capacity / autonomy | <p>a) The qualities and transferable skills necessary for employment requiring:</p> <p>i) exercise of initiative and of personal responsibility and accountability; and</p> <p>ii) decision-making in complex situations;</p> <p>b) The intellectual independence required for continuing professional development;</p> | 4. Ethical Behaviour & Social Responsibility | <p>4.1 Identify the ethical and societal implications of AI and its applications in business</p> <p>4.2 Describe, analyze, and devise solutions for ethical and social issues that arise in the application of AI in business</p> |

| | | | |
|-----------------------------------|---|-------------------------------|---|
| | <p>c) The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and</p> <p>d) The ability to appreciate the broader implications of applying knowledge to particular contexts.</p> | | |
| 5. Level of communications skills | The ability to communicate ideas, issues and conclusions clearly. | 3. Professional Communication | <p>3.1 Deliver a clear, effective and engaging oral presentation appropriate for both technical and non-technical audiences</p> <p>3.2 Prepare a clear, effective and engaging written report appropriate for both technical and non-technical audiences</p> <p>3.3 Apply appropriate strategies to work effectively in interdisciplinary teams</p> |

**Mapping of Master of Management in Artificial Intelligence (MMAI) Program
Learning Outcomes against Master Degree Level Expectations**

| MMAI Outcomes | | Master Degree Level Expectations |
|---|---|--|
| <p>1. Core Business AI Understanding</p> | <p>1.1 Describe the key components of the artificial intelligence (AI) field, including search heuristics, knowledge representation, automated planning, agent-based systems, machine and deep learning, and probabilistic reasoning</p> <p>1.2 Connect key AI components to the cornerstones of modern business management</p> | <p><u>Depth and Breadth of Knowledge</u></p> <p>A systematic understanding of knowledge, including, where appropriate, relevant knowledge outside the field and/or discipline, and a critical awareness of current problems and/or new insights, much of which are at, or informed by, the forefront of their academic discipline, field of study, or area of professional practice.</p> <p><u>Research & Scholarship:</u></p> <p>A conceptual understanding and methodological competence that:</p> <p>a) enables a working comprehension of how established techniques of research and inquiry are used to create and interpret knowledge in the discipline;</p> <p>b) enables a critical evaluation of current research and advanced research and scholarship in the discipline or area of professional competence; and</p> <p>c) enables a treatment of complex issues and judgments based on established principles and techniques;</p> |
| <p>2. Critical Thinking and AI Applications</p> | <p>2.1 Analyze the application of AI technologies for business problems, including knowledge management, information retrieval, decision support systems, natural language processing, process automation, personalization and visualizations</p> <p>2.2 Design, implement, evaluate, and refine AI technologies for solving business problems</p> <p>2.3 Understand and analyze the trade-offs between computational complexities and business benefits in applying different AI techniques and models</p> <p>2.4 Apply strategic thinking skills for managerial decision making</p> | <p><u>Level of application of knowledge:</u></p> <p>Competence in the research process by applying an existing body of knowledge in the critical analysis of a new question or of a specific problem or issue in a new setting.</p> <p><u>Research & Scholarship:</u></p> <p>On the basis of that competence, has shown at least one of the following:</p> <p>b) Originality in the application of knowledge.</p> <p><u>Professional capacity / autonomy:</u></p> <p>a.ii) decision-making in complex situations</p> <p>b) The intellectual independence required for continuing professional</p> |

| | | |
|--|---|--|
| | | <p>development</p> <p>d) The ability to appreciate the broader implications of applying knowledge to particular contexts</p> <p><u>Awareness of Limits of Knowledge:</u></p> <p>Cognizance of the complexity of knowledge and of the potential contributions of other interpretations, methods, and disciplines</p> |
| 3. Professional Communication | <p>3.1 Deliver a clear, effective and engaging oral presentation appropriate for both technical and non-technical audiences</p> <p>3.2 Prepare a clear, effective and engaging written report appropriate for both technical and non-technical audiences</p> <p>3.3 Apply appropriate strategies to work effectively in interdisciplinary teams</p> | <p><u>Research & Scholarship:</u></p> <p>On the basis of that competence, has shown at least one of the following:</p> <p>a) development and support of a sustained argument in written form</p> <p><u>Level of Communications Skills:</u></p> <p>The ability to communicate ideas, issues and conclusions clearly.</p> <p><u>Professional Capacity / Autonomy:</u></p> <p>a) The qualities and transferable skills necessary for employment requiring:</p> <p>i) exercise of initiative and of personal responsibility and accountability</p> |
| 4. Ethical Behaviour & Social Responsibility | <p>4.1 Identify the ethical and societal implications of AI and its applications in business</p> <p>4.2 Describe, analyze, and devise solutions for ethical and social issues that arise in the application of AI in business</p> | <p><u>Professional capacity / autonomy:</u></p> <p>a) The qualities and transferable skills necessary for employment requiring:</p> <p>i) exercise of initiative and of personal responsibility and accountability; and</p> <p>ii) decision-making in complex situations;</p> <p>c) The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research</p> |

Appendix D

Competitive Landscape

| University | Degree Granted | Duration | General Approach | Specializations |
|--|---|---|---|-----------------|
| Canada | | | | |
| Queen's University Smith School of Business | Master of Management in Artificial Intelligence | A 12-month program starting in September. Classes on Tuesday evenings and alternate Saturdays at Smith Toronto in downtown Toronto. Plus, two one-week residential sessions at Goodes Hall in Kingston. | A balance between technical, management, and problem-solving content. A capstone project in the final module allows individual students to apply AI solutions to real business cases provided by program partners. This is structurally a similar program to the proposed MMAI at Schulich. However, Schulich has a set of relationships to the local AI Business Community and on-site facilities (notably the Deloitte Lab) that make us the more competitive offering. | N/A |
| United States of America | | | | |
| New York University Stern School of Business | MS in Data Analytics & Business Computing | a 12-month full-time course of study, the three-semester curriculum is 36 credits, including a capstone project that culminates the program and connects students with real-world practice. | A data-driven approach to solve business challenges in the era of big data with the interdisciplinary nature of business analytics offering a broad yet rigorous curriculum in business (finance, marketing, revenue management, operations), data science (statistics, | N/A |

| | | | | |
|--|---|---|---|---|
| | | | <p>econometrics, data mining, data visualization), and management science (optimization, stochastic modeling, simulation) emphasizing both quantitative and technical methods and their applications in different functional areas in business. This program shares many similarities with the proposed MMAI at Schulich. Overall, it is somewhat more science driven while the Schulich approach will be more managerial in its outlook.</p> | |
| <p>The University of Arizona Eller College of Management</p> | <p>Master of Science in Business Analytics</p> | <p>Students have the option of completing the 33-unit program in two or three semesters (10 or 16 months). A summer internship is possible in the three-semester program.</p> | <p>This program provides essential knowledge and skills in three critical areas: Data management, Statistics, and Analytic method. While the 16-months option is comparable to the Schulich MMAI, the 10-month program is certainly not. Also, the location of the program at the University of Arizona limits the ability to create close relationships with world class companies nearby.</p> | <p>electives in accounting, economics, finance, management information systems and marketing. The program also includes professional development.</p> |
| <p>Rutgers University Rutgers Business School</p> | <p>Master of Information Technology and Analytics</p> | <p>30 credits Full-time or part-time study Finish in as little as one year (full-time). STEM qualified</p> | <p>The program intends to bridge the gap between IT and business, teaching both the domain and technical knowledge</p> | <p>Accounting Information Systems</p> |

| | | | | |
|--|---|--|---|------------|
| | | <p>program for international students considering Optional Practical Training (OPT). Based out of Newark campus</p> | <p>necessary to face tough challenges in the industry. Similar approach to the Schulich MMAI. The school's location allows for excellent relations to world-class companies. The main difference is Schulich's facilities and the more managerially oriented curriculum.</p> | |
| <p>University of Maryland Robert H. Smith School of Business</p> | <p>Master of Science in Information Systems</p> | <p>30 credits can be completed in as little as 9 months, though most students complete the program in 16 months.</p> | <p>The curriculum delivers real-world learning supported by theory and practice. Smith School's partnerships with companies like Ernst & Young, Deloitte, PricewaterhouseCoopers, and KPMG make it a very competitive program. It's positioning is similar to that of Schulich's MMAI.</p> | <p>N/A</p> |
| <p>University of Utah David Eccles School of Business</p> | <p>Master of Science in Business Analytics</p> | <p>33 Credit hours Core: 30 Electives: 3 For the full-time program. Full-Time students complete the program in 3 semesters. Part-Time students complete the program in 4-6 semesters. Students complete a hands-on capstone project as the culmination of their degree. The capstone is an in-depth, consulting-based project where students complete data analysis for industry partners.</p> | <p>The business analytics curriculum is designed to help students increase their skills in each of these areas, and students exit the program ready to successfully compete in the world of big data. The coursework is designed to prepare students to complete the Associate Certified Analytics Professional (aCAP) certification through INFORMS. Subjects, including data storage and management, data</p> | <p>N/A</p> |

| | | | | |
|--|--|---|--|--|
| | | <p>The capstone project is three credit hours completed over three semesters.</p> | <p>analysis, data visualization and the application of analytics to business, prepare students for this highly recognized certification. This is a very competitive program. It's positioning is similar to that of Schulich's MMAI.</p> | |
|--|--|---|--|--|

Appendix E

Master of Management in Artificial Intelligence Program Core Course and Potential Instructor List

| | Course | Title | Instructor | Full /Part Time (FT/PT) | Rank | Area |
|-----|-----------------------|---|--------------------|-------------------------|-----------|------|
| 1. | SB/MMAI 5000 3.00 | Artificial Intelligence Fundamentals | Zhepeng Li | FT | Assistant | OMIS |
| | | | Hjalmar Turesson | PT | N/A | |
| 2. | SB/MGMT 6300 3.00 | Case Analysis & Presentation Skills | Ashwin Joshi | FT | Associate | MKTG |
| | | | Brent Lyons | FT | Assistant | ORGS |
| 3. | SB/MMAI 5100 3.00 | Database Fundamentals | Henry Kim | FT | Associate | OMIS |
| | | | Zhepeng Li | FT | Assistant | |
| | | | Stephen Keelan | PT | N/A | |
| 4. | SB/MMAI 5200 3.00 | Algorithms for Business Analysis | Markus Biehl | FT | Associate | OMIS |
| | | | Scott Yeomans | FT | Full | |
| | | | Ikjyot Singh Kohli | PT | N/A | |
| 5. | GS/PHIL 5340 3.00 | Ethics of AI | Regina Rini | FT | Assistant | PHIL |
| 6. | SB/MMAI 5040 3.00 | Business Applications of Artificial Intelligence I | Hjalmar Turesson | PT | N/A | OMIS |
| | | | Mel Gabriel | | | |
| 7. | SB/MBAN 5140 3.00 | Visual Analytics and Modelling | Stefan Popowycz | PT | N/A | OMIS |
| 8. | SB/MMAI 5300 3.00* | Numerical Analysis | Markus Biehl | FT | Associate | OMIS |
| | | | Scott Yeomans | FT | Full | |
| | | | Hjalmar Turesson | PT | N/A | |
| 9. | SB/MMAI 6050 6.00 | AI Consulting Project | Murat Kristal | FT | Associate | OMIS |
| 10. | SB/MMAI 5090 3.00* | Business Applications of Artificial Intelligence II | Zhepeng Li | FT | Assistant | OMIS |
| 11. | SB/MMAI 5500 3.00 | Applications of Neural Networks and Deep Learning in Business | Zhepeng Li | FT | Assistant | OMIS |
| 12. | SB/MMAI 5400 3.00 | Natural Language Processing | Henry Kim | FT | Associate | OMIS |
| | | | Hjalmar Turesson | PT | N/A | |
| 13. | SB/ORGS 6350 3.00 | Managing Change | Kevin Tasa | FT | Associate | ORGS |
| 14. | SB/ORGS 6500 3.00 | Interpersonal Managerial Skills | Stephen Friedman | PT | N/A | ORGS |

Appendix F

Statement of Support from Anchor Dean

Memorandum

To: To Whom It May Concern
CC: Professor Murat Kristal, Chair, MMAI Task Force
From: Detlev Zwick, Acting Dean
Date: October 18, 2018
Subject: Master of Management in Artificial Intelligence Proposal

I would like to enthusiastically express my full support for the proposed Master of Management in Artificial Intelligence (MMAI) program. This program will enable students who have graduated from business or non-business programs to obtain the critical functional and cross-functional skills needed for a successful career in the fast expanding, demanding and heterogeneous field of management of AI.

The need for graduates with the skill set of a manager of AI is high and growing rapidly. Currently, only one specialized program exists in Ontario (Queen's University) and very few others in North America. Therefore, there is a significant need for programs that can deliver excellent training in management skills, AI technologies and ethics. The proposed MMAI represents such a program and we are confident that our graduates will succeed in a job market that is high paying, fast-moving and full of gratifying career opportunities.

Just as with all our programs, Schulich will staff this program with high quality full-time and part-time faculty. Because of its extensive partnership network with leading companies in Toronto, Schulich is fully capable of delivering high quality experiential projects to the students. Already, many companies have signed on to the AI Consulting project, paying \$25,000 to do so, even though the program has not yet launched. Therefore, no additional resources will be required to source and support the AICPs.

The Schulich School has the facilities in place to offer this program. Through the partnership with Deloitte the program offers a world-class environment, such as the Schulich Deloitte Cognitive Analytics and Visualization Lab located in the school's brand-new Graduate Study & Research Building. This new addition to the school is a \$60 million state of the art building, which is home to 3 large classrooms, several seminar rooms, a media production facility and offices for Schulich's Centers of Excellence.

Even though teaching staff is in place to deliver the program, the Operations Management and Information Systems (OMIS) area, which will deliver the program (with support from other areas), is authorized to hire three additional tenure-stream faculty members over the next three years. These three hires were submitted to the President as part of Schulich's 3-year hiring plan, which was approved by the president. A world class data scientist has already been hired in partnership with Deloitte. This person will support lab work, research and AICP projects.

At this time, we do not foresee the need to add any additional non-academic resources, such as additional recruiting, student or career support personnel. As the program grows, non-academic support, especially in career advisor and recruiting will be added via the usual mechanisms. Some of these resources may be shared with the Master of Business Analytics and other programs.

In conclusion, I wish to express my full support for this program and thank the task force for a well- conceptualized proposal.

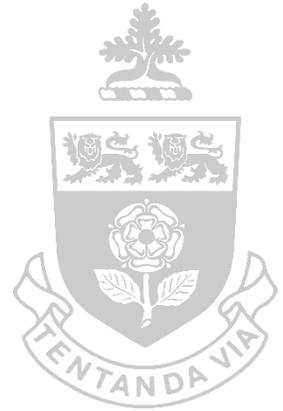
Memorandum

To: ASCP and APPRC

From: Lisa Philipps, Provost and Vice-President Academic

Date: December 8, 2018

Subject: Proposal for Schulich Master of Management in AI



I have reviewed the proposal for Master of Management in Artificial Intelligence as well as Acting Dean Detlev Zwick's letter dated October 18, and I am pleased to offer my full support for the proposal at this stage in the approval process.

As Acting Dean Zwick points out, the demand for various levels and types of professional expertise in all areas of artificial intelligence is already high and growing at a rate that post-secondary educational institutions will need to respond to. The proposed program will prepare professional leaders and managers from a variety of educational backgrounds.

The Schulich School of Business is well-poised to enter this area. It has an excellent reputation for providing graduate education in both traditional and emerging fields of management, and its partnership with Deloitte has allowed it to create a state of the art Cognitive Analytics and Visualization Lab located in the new Graduate Study and Research Building.

I am persuaded that the School has considered its staffing needs carefully and, with the presence of the data scientist shared with Deloitte and the addition of two tenure track professors over the upcoming three years that has been included in the Faculty's complement plan, the academic resources will be in place to mount a successful program. Support for students and programs within Schulich is well-developed and of high quality, and the Acting Dean has provided assurance that this program can be folded into the existing infrastructure. A graduate program assistant and academic program director will be appointed as for all graduate programs at York.

I look forward to discussion of the proposal and, in particular, to the report of the review team following its review of the materials and a site visit.

Cc: Dean D. Horvath, Acting Dean Zwick
VPA A. Pitt

November 12, 2018

RE: BBA/IBBA Program, Schulich School of Business

Dear Associate Dean Zwick

I'm writing this letter on behalf of Lassonde School of Engineering, in consultation with Prof. Simone Pisana, Graduate Program Director at the department of Electrical Engineering and Computer Science (EECS). We have reviewed and carefully considered the proposal for the creation of the new Master of Management in Artificial Intelligence (MMAI) in the Schulich School of Business at York University.

We understand that this new professional degree program, offered by the Schulich School of Business, and will address a need for Management expertise in the rapidly expanding field of Artificial Intelligence. We note that at Lassonde, also have recently introduced the AI specialization in our Master of Science in Computer Science program and are in the process of proposing a professional Master's program in Data Science with an AI focus. Comparing the proposed MMAI program with our AI specialization and Data Science programs, we are confident that our programs will not be competing with MMAI for students, considering that we will have significantly different learning outcomes. Furthermore, we anticipate that students in our programs may find interest in a few of the MMAI courses such as the Business Applications of AI, case management and presentation skills.

Together, the Faculty of Science, Schulich, and Lassonde will be well positioned to lead AI training for the growing demand that is emerging in Canada.

Regards

A handwritten signature in black ink, appearing to read "Regina Lee". The signature is fluid and cursive.

Regina Lee, PhD, PEng

Cc: Dean Jane Goodyer, Vide Dean Uyen T Nguyen, Prof. Simone Pisana

FACULTY OF SCIENCE

Office of the Dean

4700 KEELE ST.
TORONTO ON
CANADA M3J 1P3
T 416 736 5051
F 416 736 5950

www.science.yorku.ca

Memorandum

To: Detlev Zwick, BBA / iBBA Program, Schulich School of Business

From: Jennifer Steeves, Associate Dean – Research & Graduate Education &
Alex Mills, Associate Dean - Students

Date: November 6, 2018

Subject: Program Proposal for a Master of Management in Artificial Intelligence
(MMAI).

J.S. 

The Faculty of Science supports the proposal for the creation of the new Master of Management in Artificial Intelligence (MMAI) in the Schulich School of Business at York University.

This new professional degree program will address a need for Management expertise in the rapidly expanding field of Artificial Intelligence. It will be unique in that students will be trained in both managerial and technical skills producing graduates who can support management of wide range of rapidly emerging high level AI technologies. There is no overlap between this program and courses offered in the Faculty of Science. Both the Faculty of Science and the Lassonde School of Engineering at York University are presently training graduates who will be poised to work in the field of AI and in turn the Schulich MMAI will yield leaders in AI-management.

JS/js





UNIVERSITÉ
UNIVERSITY
LIBRARIES

Office of the Dean

516 Scott Library
4700 KEELE ST.
TORONTO ON
CANADA M3J 1P3
T 416 736 5601
F 416 736 5451
www.library.yorku.ca

Memorandum

To: Murat Kristal, Program Director, Master of Business Analytics,
Schulich School of Business

From: Joy Kirchner, Dean of Libraries

Date: October 26, 2018

Subject: Library Support for Master of Management in Artificial Intelligence

As the attached memo attests, York University Libraries are well-situated to support the proposed new graduate program in the management of artificial intelligence. The Libraries have extensive collections to support teaching, learning, and research in this area due to existing curricular and research strengths in artificial intelligence and related business areas at York University. The Libraries have a long-established relationship with the Schulich School of Business that helps ensure support for acquiring needed and specialized resources in business programs is facilitated. Further, there is librarian expertise at York to support faculty and students within this program.

The Libraries are engaged in extensive restructuring at the moment, with the aim of continuing to provide the excellent collections and instructional and consultation expertise it has provided in the past, but to also better leverage library expertise and infrastructure to better support emerging needs around resource accessibility, open educational resources, and data management, to name a few. You will be hearing more about these developments over the coming months.

We look forward to our continued work with the Schulich School of Business over the coming years and are excited to fully support this new program.



External Appraisal Report

Dr. Alice Pitt, Vice Provost Academic
931 Kaneff Tower
4700 Keele Street
Toronto, ON
Canada, M3J 1P3

January 22, 2019.

Dear Dr. Pitt,

It was a pleasure to serve on the external reviewing team for the proposed Master of Management in Artificial Intelligence (MMAI) program at the Schulich School of Business, York University. The review involved studying the program in detail, evaluating the credentials of the faculty supporting the program and on-site discussions with key stakeholders.

Overall, we are enthusiastic in supporting this program and believe it is very timely, designed well and supported well by a talented and energetic team of faculty and university administrators. There are not many programs that are similar to this – a strength of the program – hence, direct comparisons are difficult. However, the program appears to deliver on its learning outcomes and goals. In this letter, we offer comments and feedback based on the external appraisal report criteria outlined in the York University Quality Assurance Procedures. Details are as follows.

Outline of the Visit

During our visit to the Schulich School of Business on Monday, January 7th, we were fortunate to engage in lively discussions with the following:

- Academic Vice Provost and Dean of Graduate Studies at York University
- The Dean and Associate Dean of the Schulich School of Business
- Faculty members of the MMAI task force and other full-time faculty and part-time instructors that will be involved with the program
- Current students enrolled in various undergraduate and graduate degree programs at Schulich
- Staff members that support the admissions, student services, career development, and library functions

As part of the visit, we also toured facilities at the Schulich School of Business, including classrooms, computer labs, meeting rooms, and the new Schulich Deloitte Visual Cognitive Analytics Lab.

General Objectives of the Program, Need, and Demand

The primary objective of the program is to place students in AI-related managerial positions in the private, public, and non-profit sectors. This objective is well-aligned with the Schulich

School and York University's broader mission. We believe the program name and degree designation are appropriate and consistent with the curriculum, student learning objectives, and program-level goals.

With respect to need and demand, the program is closely aligned with the Vector Institute's 1000AIMS initiative, which supports Ontario's goal of producing 1000 graduates annually in the field of AI within the next five years. In addition to serving demand in the local Ontario region, based on our discussions with faculty and staff at Schulich, there is a sense that the prospective student pool and employers pertaining to the MMAI program are both geographically much broader, encompassing high AI-growth markets such as North America, Asia and Europe. Given Schulich's strong global footprint, MMAI seems well-positioned to cater to the supply and demand needs of such a wider geographic market.

Program Content, Curriculum, Structure, Learning Outcomes

On the curricular side, the design of the program has been thought through quite systematically. The coursework includes a combination of technical and managerial content. Unlike programs that separate out technical and managerial content into separate courses, it was refreshing to see that many of the proposed courses actually had these two components integrated within the course itself. The two-semester project course will also allow the students to apply the knowledge from the courses into real-world applications. It was particularly refreshing to see companies that have already signed-on to participate in these projects with commitments of approximately \$25K toward supporting the projects. Great execution of these project courses will require close involvement with industry partners and it appears that the program has been designed with such close interaction in mind. Further, Schulich's close connections with leading firms and executives is a major plus for this program.

Also on the curricular side, it was encouraging to see that the content provided by the program can position students for a broad range of opportunities in the field. Courses in AI, algorithms, data science, databases, numerical analysis, visualization, NLP coupled with case analyses and business foundations (through additional electives) will provide Schulich students with a broad background in the field to pursue opportunities in many different areas. The ethics of AI course is in particular an important component and appears to be positioned well (early) in the program to help students understand the societal and people impact of AI.

We do have a few suggestions on the curriculum that we discuss in our recommendations.

Resources

We were equally impressed by the quality of the faculty supporting this program. Many of the courses, while new, appear to have existing faculty who can cover them. Based on our discussions and examination of bios/CVs, these faculty clearly have a wealth of expertise on relevant topics such as the foundations and theory of AI and machine learning, as well as the state-of-the-art tools, techniques, and practices. Overall, the program appears to have a good

mix of full-time tenure stream research faculty and part-time faculty with active involvement in industry. MMAI's faculty composition seems consistent with what is found at other top business school degree programs, with over 50% of the content delivered by full-time faculty, while actively leveraging knowledgeable practitioners with strong academic credentials and teaching experience. This mix will be essential to ensure that the program offers insightful perspectives from both the research as well as the applied angles – academic rigor coupled with industry relevance. The plan to hire two additional faculty members (approved by the President as part of the college's three year plan) will also be a significant plus in terms of offering additional faculty resource support for this program.

The program also appears to leverage existing staff expertise and resources needed to fuel a successful launch. Further, the incorporation of one or two new staff members for this program (as noted in the proposal) will help from a student success perspective.

We do have a few suggestions on the need for greater staff-side resources (see recommendations for details).

Quality of Student Experience

By incorporating a nice mixture of full-time and part-time faculty, the two consulting courses, and several options for the two elective courses, the MMAI program is well-positioned to ensure the intellectual quality of the student experience. Based on our discussions with the students we do have some recommendations, noted below, to further enhance this.

Recommendations

As part of our review we have some specific recommendations for the leadership to consider. While the program as proposed is ready for launch and none of these are required changes, we believe that they can further strengthen what appears to be a very well thought-through program. These recommendations are:

Curriculum-related:

1. *Explore a business foundations "boot camp."* One of the limitations of any specialized Master's program is not being able to offer a breadth of courses in all the functional disciplines. This is quite common among most of the specialized Master's programs we have seen across the world. However, the MMAI graduates will still need a broad grasp of important business concepts in finance, accounting, strategy & management, marketing, operations and information systems. Currently, the coursework does integrate many of the business skills into specific courses; hence students do get some exposure. However, augmenting this with directly delivered content in these areas in the form of a one-week long intense boot camp at the start of the program may better align curriculum with the managerial learning objectives and positioning of the program. The faculty will need to decide which topics across the functional areas are important to cover in the boot camp since an exhaustive overview is infeasible. The

boot camp itself can then be designed as a “30-40 hour mini-MBA” prior to the start of the specialized Master’s program. It is important to note that the boot camp idea is by no means the only way to incorporate the necessary business foundations content into the curriculum. We simply suggested it as one relatively easier approach for onboarding diverse student populations to create an appropriate baseline of business knowledge without significantly disrupting the rest of the program design.

2. *Consider injecting content related to Enterprise AI.* One of the missing pieces in the content was an overview of enterprise AI architectures. Today AI systems combine software, hardware, the cloud and people & processes to deliver real-time solutions. AI is an important consideration in enterprise-level digital transformation at the intersection of datafication, platformization, consumerization, and democratization. As one example, much of the revolution in self-driving cars has been supported by novel internet of things (IoT) hardware and architecture frameworks, in addition to data-driven algorithms. This broader discussion of current “architectures” in AI, and how AI relates to enterprise digital strategy, will provide students with the necessary perspective pertaining to real-world enterprise AI solutions. We don’t see the need for a new course on this topic, but recommend the addition of a module in one of the existing courses that addresses this gap.

3. *Add a full-time faculty member to the AI fundamentals course.* Presently, this course is being taught entirely by part-time faculty with impressive industry experience. We’re all products of our experiences – practitioners are often biased towards more recent trends and phenomenon. Full-time faculty involvement in this course can help ensure that students have a more balanced perspective on the fundamental theories and practices of AI.

Resource-related:

4. *Add a staff person to identify capstone projects and manage corporate relations.* We recommend hiring a new staff member for program support. The staff member can help identify capstone projects and manage corporate relationships. This is a common staff position/role in most specialty master’s programs involving multi-semester corporate sponsored capstone projects. The corporate partner acquisition funnel, coupled with the immense communication and coordination costs needed to manage the relationship, necessitate staff support. In the absence of adequate staff support, these tasks can take up valuable faculty/program director time that would be better utilized supporting student efforts toward the successful execution of these projects.

5. *Consider providing the student body a modest budget to plan events.* We recommend the student body (see below) be provided a small budget of their own to plan events, speaker series or workshops to enhance the quality of the student experience. While we explain the rationale for this further below, the budget for these activities itself can be relatively modest to start with and can grow based on how the program chooses to manage these activities.

6. *Closely monitor the Ethics in AI course for continuity, quality, and consistency.* The Ethics in AI course is a particularly important course in the program and is the only one taught from outside the college of business. This course is currently slated to be taught by a post-doctoral scholar, funded in part by the college of business. We recommend having a clear long-term plan for how this course will be funded and supported, as well as how quality and consistency will be maintained. This non-business post-doctoral scholar may enrich student learning outcomes, but better explicating the plan will help ensure the long-term viability and quality of the course.

Quality of Student Experience-related:

7. *Consider forming a program-level student body.* We recommend forming a program-level student body that can serve as liaisons to the faculty with the broader goal of enhancing student experience. We envision this body taking the lead in organizing speaker series, or workshops, related to AI that can provide a constant stream of cutting-edge content from AI industry practitioners. Some of the speakers solicited may even “skype in” or provide short talks to the students through teleconference facilities, thereby opening up a vast range of global expert resources that can be tapped into. While such experiences can enhance the quality of student experience in any program, they are likely even more important in an area like AI where rapid advancements are being made constantly in industry as well. The idea of having a student body lead these efforts was motivated by three factors. First, external speakers sometimes respond more favorably when contacted directly by students rather than staff. Second, these “self-arranged” events will likely have better attendance among students. Third, it will place less stress on limited faculty and staff resources.

Thank you for the opportunity to serve as part of the external review team and best wishes for a successful launch.

Sincerely,



Ahmed Abbasi
Associate Dean and Murray Research Professor
Director, Center for Business Analytics
Co-Director, MSBA Program
McIntire School of Commerce
University of Virginia
Email: abbasi@comm.virginia.edu, Tel: +1(434) 924 7031



Balaji Padmanabhan
Director, Center for Analytics & Creativity
Professor of Information Systems and Decision Sciences
Anderson Professor of Global Management
Muma College of Business, University of South Florida
Email: bp@usf.edu, Tel: +1(813) 974 6763

Memorandum

To: Alice Pitt, Vice Provost Academic
CC: Julie Parna, Thomas Loebel, YUQAP
From: Detlev Zwick, Acting Dean
Date: January 30, 2019
Subject: Response to the External Review of Master of Management in Artificial Intelligence Proposal

OFFICE OF THE DEAN

Associate Dean Academic

4700 KEELE ST.
TORONTO ON
CANADA M3J 1P3

T 416 736 5097
F 416 736 5762

ada@schulich.yorku.ca
ada.schulich.yorku.ca

I'm writing this memo in response to the external reviewers' report on their inspection of the proposed Master of Management in Artificial Intelligence to be offered by the Schulich School of Business. The review included an in-depth examination of the program's proposed curriculum, learning outcomes, extracurricular activities, existing and planned resource allocation as well as expected market demand for the program. During their visit of the school, the reviewers had a chance to meet with the Academic Vice Provost and Dean of Graduate Studies at York University, the Dean and Associate Dean of the Schulich School of Business, Faculty members of the MMAI task force and other full-time faculty and part-time instructors that will be involved with the program. In addition, the reviewers met with students currently enrolled in various undergraduate and graduate degree programs at Schulich as well as staff members that support the admissions, student services, career development, and library functions. Finally, the reviewers had a chance to explore the school's facilities including the new Schulich Deloitte Visual Cognitive Analytics Lab, which represents an important element in the delivery of a world-class program. I am therefore confident that **the reviewers gained a comprehensive and detailed understanding of the proposed program, the school's ability to deliver it and the expected demand for this offering.**

I was therefore delighted to learn that **the reviewers' assessment of the program was very positive.** The report commends the high quality of the curriculum and expresses confidence in Schulich's ability to attract, train and place high-caliber students. Indeed, while the reviewers offer several very insightful recommendations for improving the curriculum and the academic and administrative execution of the program, **they state that "the program as proposed is ready for launch and none of these [recommendations] are required changes."** While this overall assessment of the program and the school is very encouraging, **we agree with the reviewers that the recommendations offered in the report will help us to further improve the quality of the curriculum and the resource base supporting it.** The reviewers offer recommendations in three areas: curriculum, support structures and student governance and experience. We address each recommendation below:

1) Curriculum-related recommendations

The reviewers make **three specific recommendations** to improve the curriculum.

a. *The Business Foundation "Boot Camp"*

The point of this recommendation is to strengthen the managerial content of the curriculum. The reviewers find the curriculum very strong on the technical side of AI but 'light' on the managerial skills required of our graduates. On reflection

of this observation, we fully agree with the reviewers and decided to strengthen the curriculum's content of managerial skills significantly. Specifically, we will implement **two changes** that we believe will improve the managerial training in the MMAI.

1. We will implement a 3-day **business foundation boot camp** (see Appendix for a likely structure of this 3-day boot camp) that focuses on three functional areas of Business (rather than all areas): Marketing, Accounting and Finance. One teaching day (6 hours of instruction) will be dedicated to each subject. There are three reasons for such a focused approach. First, knowledge from other functional business areas such as Operation Management and Information Systems and Strategy is covered well in the existing curriculum. Second, skills in the remaining functional area of business, organizational behavior, will be addressed with two new core courses (see next point). Finally, incoming students must complete a set of mandatory online modules in calculus, statistics and computer science before the start of the program (see Program proposal, section 4 for details). We therefore need to be mindful of the amount of course work students must complete before starting the actual program. A focused approach for the Business Fundamentals boot camp will keep the preparation course work at a more reasonable load.
2. We are **adding two mandatory courses** to the curriculum that we believe will make a significant difference to the students' managerial skill set. These two courses are: *Managing Change* and *Interpersonal Managerial Skills*. This change does not add to the students' course load because we eliminated two elective courses in exchange. While this means that MMAI students no longer have any electives, we believe with the reviewers that it is critical for our students' success as managers of AI to have as strong a foundation in managerial skills and concepts as is possible to convey in a one-year program. As one reviewer pointed out in conversation, many one-year programs make do without electives to ensure consistency in skills and achieved learning outcomes across the student bod.

We believe that in combination, these two changes address the reviewers' recommendations comprehensively and make the program well balanced along the managerial and the technical dimensions.

b. Ensure sufficient content related to Enterprise AI

The reviewers agreed that one of the missing pieces in the content of the curriculum was an **overview of enterprise AI architectures**. The curriculum focuses on data-driven algorithms and software, yet, enterprise-level digital transformation requires AI systems that combine software, hardware, the cloud and people & processes to deliver real-time solutions. The reviewers recommend classes where AI is discussed at the level of enterprise architecture, so students understand how AI solutions are part of a system.

We concur with the reviewers' view that managing AI requires a systems approach that includes data-related software, hardware, the cloud and people & processes. The reviewers noted that the curriculum covers very well software and processes of AI. Our changes to the curriculum described above

under 1a. address the role of people as well as processes. Therefore, we agree with the reviewers that **the area that needs strengthening is hardware and AI Enterprise architecture. Therefore, we now include specific classes dedicated to studying AI Enterprise Architecture in three different courses:**

1. The week 12 class of *MMAI 5000 Artificial Intelligence Fundamentals* now introduces the topic of AI hardware architecture via a discussion of specific subtopics:
 - a. Information Architecture plays a key role in establishing order in the continuous evolution of emerging data technologies.
 - b. Introduction of specific measures that organizations should take to embrace AI and streaming data technologies,
 - c. Introduction of AI Enterprise Architecture and IoT and how they relate to business.
2. In week 1 of the course *MMAI 5040 Advanced Artificial Intelligence* students now delve deeper into the AI Enterprise Architecture tackling technologies such as:
 - a. Embodied Artificially Intelligent Agents in Conjunction with AI Enterprise Architecture
 - b. Sensor hardware and business implications around the deployment of autonomous systems in conjunction with AI Enterprise Architecture.
3. The course *MMAI 5090 Business Applications of Artificial Intelligence* now includes a specific business case on the development and integration of AI Enterprise Architecture. Through the case the students learn about challenges and opportunities of using AI Enterprise Architecture in organizations to create competitive advantage.

c. *The Fundamentals Course should be taught by an FT faculty member.*

Given the central role of this course in the program, the reviewers felt that this course should be taught by a full-time faculty member. We fully agree with this recommendation and **we now have assigned this course to Assistant Professor of Operations Management Zhepeng Li** for teaching (please see his CV in the proposal). In addition, the home of the proposed program is Schulich Operations Management and Information Systems (OMIS) area. This area has **approval to hire three additional tenure stream faculty** and searches are currently underway. These new hires will support the new program. We should also point out that the part time faculty member listed as **additional instructor for this course, Hjalmar Turesson, holds a PhD from Princeton University in Neuroscience and maintains an active research program in AI-related areas.** Hjalmar is on an extended contract with Schulich. Therefore, we believe that the fundamentals course is in excellent hands.

2) Resource-related Recommendations

In their report, the reviewers make **three insightful recommendations regarding the resource base** supporting the program. We will address them below:

a) Add administrative staff person

To make this program a success, much hinges on the quality and availability of capstone projects required for the two-term AI consulting project course. Obtaining a strong supply of high quality projects requires building, growing and managing corporate relations. While the designated program director for the proposed program, Dr. Murat Kristal, has built such a strong network and can point to a large pool of projects his corporate partners have already commissioned and committed to financially (which is especially impressive given that the program is not yet approved!), going forward the work of acquiring new partners, identifying and coordinating projects and fostering corporate relationships must be supported by a designated staff member. Such a person would enable the program director and other faculty members to focus on the important work of supporting student learning during, and the successful execution of, the consulting projects.

Fully recognizing the need for additional administrative support, the dean has approved the hiring of a full-time staff person dedicated entirely to the new Master program.

b) Provide a budget for students to plan their own extracurricular events

Extracurricular activities play an important part in all Schulich Master programs. **In the appendix**, please find a list of **workshops and other events that are already planned** for the new MMAI program. In addition, the student body (through an executive to be elected by the students, see final recommendation below), will have **access to up to \$10,000 per year** to plan additional extracurricular activities.

c) Closely monitor the Ethics in AI course for continuity, quality, and consistency.

The reviewers recognized that the *Ethics in AI* course is a particularly important course in the program and is the only one taught from outside the college of business. This fact seems to be cause for concern regarding long-term commitment to the course and ensuring quality of teaching. While we fully share the reviewers' concern, we are confident that our current arrangement with the Department of Philosophy at York University as well as the Lassonde School of Engineering will ensure both excellent teaching and continuity. **The course was developed by CRC Prof. Regina Rini**, who will also be teaching the course in its first year. In subsequent years, the plan is to have the course taught by a **post-doctoral fellow with expertise in the required subject area** and under the guidance of Dr. Rini. We are therefore confident that this course will be of the highest quality. **In addition, this course is supported financially by funding commitments from three different sources: The Vector Institute, Schulich and Lassonde.** Funding for the first two years is secured with additional years contingent on the

dean's approval. We are therefore confident that we have secured a model for the continuous funding of this course.

3) Quality of Student Experience-related Recommendation

The reviewers recommend allowing students to form a program-level student body that can serve as liaisons to the faculty with the broader goal of enhancing student experience. We are in full support of this recommendation. Currently, **specialized master programs such as the MMAI are represented by the Graduate Business Council (GBC)**. The GBC is an executive committee made up of elected representatives from Schulich Master programs, including the MBA, IMBA and in the future the MMAI. Each specialized program elects a representative to the GBC. However, **in addition to this, we support the idea of the MMAI having its own elected committee** to deal with specific program-related issues such as organizing speaker series, workshops and other extracurricular events including social gatherings and industry-related networking and mentoring events. **Such program-specific committees already exist for our other specialized master programs.**

In conclusion, we would like to thank the external reviewers for their willingness to visit Schulich and assess our proposed program very thoroughly and competently. The feedback we received from the reviewers was very insightful. The Program Task Force was delighted take on the recommendations from the reviewers and implement several changes in the curriculum and its support structure that undoubtedly will make the program better.

Appendix

Business Fundamentals Boot Camp: Suggested Format

MMAI Bootcamp: Fall 2019

| DAY 1 | | |
|-------------------|---|------------------------------------|
| 10:00 am | Registration | SSB N201 |
| 10:30 am | Welcome: Maximizing Your MMAI Experience <i>Murat Kristal, Program Director, MMAI</i> | SSB N201 |
| 11:00 am | Grad School 101 | SSB N201 |
| 11:30 am | LUNCH & Q&A | SSB N201 |
| 1:00 pm | Building Tour & Orientation | Schulich Building |
| 2:00 pm | Library Resources Orientation <i>Bronfman Business Library</i> | SSB S236 |
| 3:30 pm | Academic Orientation <i>Murat Kristal, Program Director, MMAI</i> | SSB N201 |
| 4:30 pm | Break | |
| 5:00 pm - 9:00 pm | Launch Week Social Events (optional) <i>Club Fair, Dean's Welcome & Leaders Panel, Dean's Reception</i> | View schedule here |
| DAY 2 | | |
| 9:00 am | Welcome/Arrival | SSB N201 |
| 9:30 am | Module 1 : Fundamentals of Accounting | SSBW256 |
| 12:00 pm | LUNCH & Q&A | SSB N201 |
| 1:00 pm - 4:00 pm | Module 1 cont'd : Fundamentals of Accounting | SSBW256 |
| DAY 3 | | |
| 9:00 am | Welcome/Arrival | SSB N201 |
| 9:30 am | Module 2 : Fundamentals of Finance | SSBW255 |
| 12:00 pm | LUNCH & Q&A | N201 |
| 1:00 pm - 4:00 pm | Module 2 cont'd : Fundamentals of Finance | SSBW255 |
| 5:30 pm | MMAI Meet & Greet <i>Cocktail reception with faculty, current students, industry guests and student clubs. (Dress code: business casual)</i> | ELC Dining Room |
| DAY 4 | | |
| 9:00 am | Welcome/Arrival | SSB N201 |
| 9:30 am | Module 3 : Fundamentals of Marketing | SSBW255 |
| 12:00 pm | LUNCH & Q&A | SSB N201 |
| 1:00 pm - 4:00 pm | Module 3 cont'd : Fundamentals of Marketing | SSBW255 |
| 5:00 pm | Wrap-Up | SSB N201 |

Extracurricular Activities

Outside the curricular activities students have the option to engage in regular extracurricular learning opportunities. Below is a list of workshops, speaker series and other types of extracurricular activities that will be offered to students of the MMAI program.

A. Leadership Speaking Series – 5 sessions

Main learning objective is to perfect and polish professional speaking. This program is based on the science of Speech Pathology (i.e. How the brain makes new speech changes, whether these changes apply to accent, the voice, pacing and eliminating negative speech habits.)

Learning Outcomes:

- Pronounce English clearly and confidently
- Use individual tone and pacing to deliver a strong message
- Use voice projection, voice pitch and resonance
- Eliminate negative speech habits (“um”, “up” tone, etc.)
- Use body language and facial expression
- Deliver dynamic presentations
- Build confidence and success in job interviews
- Present ideas more persuasively - so that people appreciate the full value of insights

B. **Business Analytics Case Preparation – 3 sessions**

This series intends to develop analytical thinking in solving business problems--simple and complex. The focus is on defining analytical thinking, its importance, and differences from synthetic and other forms of logical approaches to solve problems and make conclusions and recommendations for Business Analytics cases. The workshop series will instill necessary skills needed to understand key success factors for technical case interviews leading to a successful interviews and careers in business analytics. The course is delivered via the following modules which have rigour of both analytical methods and tools and real world examples and case studies to explain concepts to arrive at logical conclusions. One of the key objectives of the course is to also develop skills to work with partial data and facts to make best possible analytical judgements and recommendations necessary for successful case analysis that has become a standardized practice across industries.

The workshops include a curriculum guide that contains a description of each topic discussed and in-class activities to highlight the skills and knowledge discussed. It also includes a folder with data sources and case studies that are used for the in-class activities and case practice.

Learning Outcomes:

- Analytic vs Synthetic Thinking - Case study
- Pattern recognition, outliers, co-movement of variables - Examples and case study
- Causation vs Correlation - Examples and case study
- Predictive vs Prescriptive Analysis - Examples and case studies
- Survey Analytics - Examples and case studies
- Big Data vs Non-Big Data - Examples and case studies
- Analytics in Business - Theory vs Practice
- Machine Learning, Artificial Intelligence
- Conclusion

C. **Hadoop Workshop**

Hadoop is an open-source software framework for storing data and running applications on clusters of commodity hardware. It provides massive storage for any kind of data, enormous processing power and the ability to handle virtually limitless concurrent tasks or jobs. The workshop will include a curriculum guide that contains a description of each topic discussed and in-class activities to highlight the skills and knowledge discussed.

Learning Outcomes:

- Introduction Advanced analytics at a particle accelerator
- Review Big data, databases and map-reduce
- Interactive Exercise – Map-Reduce
- Hive – Exemplary Hadoop “Database”
- How to Deliver Hadoop to Clients with a Relational Database
- Spark – The Data Scientist’s Go-To Toolbox
- Interactive Exercise – Using Spark for Analytics
- Further learning resources

D. **SQL Workshop**

Structured Query Language (SQL) is a standard computer language for relational database management and data manipulation. SQL is used to query, insert, update and modify data. The workshop will include a curriculum guide that contains a description of each topic discussed and in-class activities to highlight the skills and knowledge discussed.

Learning Outcomes:

- Introducing SQL Server: Schemas, Constructing tables, Data Types
- SQL Overview: Basic elements of query, Clauses, Operators, Handling NULL
- Querying multiple Tables: Different kinds of Joins, Set Operators
- Scalar Functions: Arithmetic, String, Data Type Conversions, CASE
- Aggregate Functions: Grouping and Aggregates
- Subqueries, CTE, Views
- Introduction to Stored Procedures

E. **Tableau Data Visualization Workshop**

Students learn the key skills needed to excel in a data-driven environment and learn techniques to

solve data-driven business problems in any industry through effective data visualization. The workshop includes a description of each topic discussed and in-class activities to highlight the skills and knowledge discussed. It also includes a digital folder with Tableau workbooks and data sources that are used for the in-class activities.

Learning Outcomes:

- Build advanced charts and visualizations
- Learn statistical techniques to analyze data
- Understand how to combine data from multiple data sources and tables
- Create better dashboards by leveraging visual communication design best practices
- Learn how to connect with data sources.
- Discover how to use Tableau to create powerful interactive visualizations.
- Generate complex calculations to improve data discovery.
- Create basic calculations including arithmetic, custom aggregations and ratios, date math, and quick table calculations.
- Transform data with a number of visualization types, including cross tabs, bar charts, geographic maps, scatterplots and others.
- Build dashboards to share visualizations across the organization.
- Understand Tableau terminology.
- Learn Tableau tips and tricks.

F. **Azure Overview of Platform and Technology**

Technical Learning Outcomes:

- Adding Users and General Admin
- Data Loading
- Loading Data into HDFS
- Example of exposing data and processing
- DevTest Labs
- PowerBI Demonstration

G. **Data Governance Lecture Series - 3 sessions**

This workshop series provides examples of data governance practices and implementation techniques, cybersecurity concerns and strategies, Canadian and international privacy regulations, artificial intelligence/machine learning and evolutionary computing implications, and compliance requirements.

Emphasis is placed on the practical application of big data supported by presentations and discussions by industry leaders with modern examples of data sciences utilization in modern organizations,

The objective of this workshop series is to impart fundamental and practical knowledge regarding:

- modern business applications of data sciences
- principles, guidelines and applicable regulations related to data governance, digital ethics, and data privacy,
- ethical management and regulatory responsibilities associated with the use of big data, analytics, machine learning and artificial intelligence.

H. **Career Marketing: Resume and Cover Letter - 3 part series**

This workshop explains the different types of resumes with a focus on how to research, identify and explore career paths, define critical elements, and highlight qualifications and accomplishments in a compelling and relevant format. There are “take-home” resume assignments which are to be completed and submitted at the completion of the workshop series. Final Resumes are approved and uploaded into the MBAN Resume Book which is distributed to MBAN employers.

Learning Outcomes:

- Industry Overview (transitioning from classroom to corporate)
- Exploring Career Paths for MBANs
- Purpose of a Resume
- Various Formats (Chronological, Functional, Hybrid, C.V)
- Anatomy of a Resume (Categories and Sections)
- Guidelines and Integrity
- Developing Accomplishment Statements (S.T.A.R) – assignment
- Resume Checklist and Samples
- Supplementary documentation (Transcripts etc.)
- Cover Letters Techniques
- Thank You Letters and Follow-up

I. Personal Branding and Personal Statement Workshops (networking and on-line presence)

The objective of this workshop focuses on Personal Branding through the application of tactical and improvisational techniques to develop professional poise and credibility.

Learning Outcomes:

- The Value of Professional Presence and First Impressions
- What is Networking? Building your circle of influence – Examples and assignment
- Professional Grooming and Etiquette
- Personal S.W.O.T (distinguish yourself, recognize your unique skills, manage weaknesses and threats, take advantage of the opportunities) – Examples and assignment
- Personal Branding and On-line presence (leveraging blogs, Social Media – Facebook, LinkedIn, Twitter) – Examples and assignment of Personal Statement
- Techno-etiquette and Business Communication (professional emails, voice mail and texting, video/tele-conference calls)



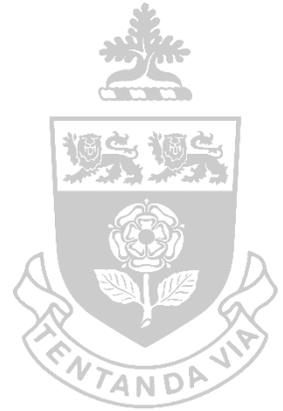
Memorandum

To: Chairs of APPRC and ASCP

From: Lisa Philipps, Provost and Vice-President Academic

Date: February 13, 2019

Subject: Proposal for Schulich Master of Management in AI



In addition to the proposal for a Master of Management in Artificial Intelligence, I have now considered the review report and a revised Dean's letter that includes responses to the reviewers' recommendations.

The reviewers state that, "Overall we are enthusiastic in supporting this program and believe it is very timely, designed well and supported by a talented and energetic team of faculty and university administrators." Their report was very detailed, identifying curricular innovations, strong partnerships with industry, and faculty expertise as major strengths. They did provide several recommendations that they describe as enhancements to the program rather than necessary. These have been considered by the program proponents who have made changes to the proposal.

These changes, which are detailed in an separate document, include the addition of a business foundations boot camp, two mandatory courses to strengthen managerial skills, adding classes within courses to address AI Enterprise architecture, assigning a full-time faculty member to teach the Fundamentals Course, securing approval for a dedicated administrative staff person, providing funding for students' own extracurricular events, and establishing a program-specific student group.

An innovative feature of the program is an ethics course developed by Professor Regini Rini, a member of the Department of Philosophy who holds a Canada Research Chair in Moral and Social Cognition. This course will serve students in the MMAI as well as those enrolled in an AI stream in the Lassonde School of Engineering, who will take the course together with students in the Philosophy MA. The program secured funding from the Vector Institute to develop the course and to support mounting it for two years (with contributions by Schulich and Lassonde). This is an important instance of cross-Faculty collaboration, and while the commitment to the course is the responsibility of the Schulich Dean in collaboration with colleagues from Liberal Arts and Professional Studies and the Lassonde School of Engineering, I have a keen interest in the success of this initiative and will also monitor it closely.

The reviewers provided valuable feedback that has been met with enthusiasm and creativity on the part of the proponents. We learned very recently that, in addition to the development funding provided by the Vector Institute, the program proposal has been approved by the Institute (contingent upon approval by Quality Council). I congratulate all those involved in the process of developing, reviewing and refining this proposal, and I heartily support its approval.

Cc: Dean D. Horvath
VPA A. Pitt

A handwritten signature in black ink, appearing to read "Dean D. Horvath". The signature is fluid and cursive, with a large initial 'D' and 'H'.



**REGISTRAR'S OFFICE
& STUDENT
FINANCIAL SERVICES**

Memo

Bennett Centre for Student
Services
Suite W223
4700 Keele St.
Toronto ON
Canada M3J 1P3

yorku.ca/osfs

To: Senate Committee on Awards

From: Haiyan Zhao, Interim Director, Student Financial Services
Karen Warner, Manager Scholarships and Bursaries
Oana Alexandru, Senior Financial Analyst

Date: March 1, 2019

Re: 2017 - 2018 Undergraduate Award Disbursement Report

Overview

The purpose of this memo is to provide a summary of York University's undergraduate award disbursement for Fiscal 2017-18 (May 1, 2017 to April 30, 2018) versus Fiscal 2016-17 (May 1, 2016 to April 30, 2017).

Table A provides a summary of all awards and bursaries disbursed to York University undergraduate students (Keele and Glendon campuses combined) categorized by Funding Source (Figure 1) and Recipient Headcount (Figure 2). Data in Figure 1 and Figure 2 was obtained from the York University *Quick-Facts* which is published by York University's Office of Institutional Planning and Analysis (OIPA).

Overall, the amount of Undergraduate Award funding disbursed to York University students *decreased* from Fiscal 2016-17 (\$31,106,396) versus Fiscal 2017-18 (\$29,122,396) which represents a 6.4% year over year spending change. Despite the decrease in spending, the number of recipients increased year over year by 10.1% (FW16-17: 27,096 vs. FW17-18: 29,838).

TABLE A: 2017-2018 Undergraduate Awards Note 1

Figure 1 - Overview of Award and Bursary Funding (\$ Disbursed)

| Award Funding Category | | 2015-2016 (\$)'000s | 2016-2017 (\$)'000s | 2017-2018 (\$)'000s | Variance 16/17 vs 17/18 (\$)'000s | YOY % Variance 16/17 vs 17/18 |
|----------------------------------|---------------------------|------------------------|------------------------|------------------------|---|-------------------------------------|
| York Funded | Entering Student Awards | \$10.9M | \$10.9M | \$9.6M | -\$1.3M | -11.9% |
| | Continuing Student Awards | \$10.8M | \$11.4M | \$11M | -\$425K | -3.5% |
| Government Funded | | \$1.7M | \$1.8M | \$1.46M | -\$340K | -18.9% |
| Private Donations and Endowments | | \$6.3M | \$7M | \$7.09M | \$87K | 1.3% |
| TOTAL | | \$29.7M | \$31.1M | \$29.1M | -\$2M | -6.4% |

Figure 2 - Number of Students who Received Awards and Bursaries (Headcount #) Note 2

| Award Funding Category | | 2015-2016 (Heads) | 2016-2017 (Heads) | 2017-2018 (Heads) | Variance 16/17 vs 17/18 (Heads) | YOY % Variance 16/17 vs 17/18 |
|----------------------------------|---------------------------|----------------------|----------------------|----------------------|--|-------------------------------------|
| York Funded | Entering Student Awards | 11,193 | 10,707 | 11,874 | 1,167 | 10.9% |
| | Continuing Student Awards | 9,156 | 11,275 | 12,206 | 931 | 8.3% |
| Government Funded | | 858 | 925 | 1,279 | 354 | 38.3% |
| Private Donations and Endowments | | 3,678 | 4,189 | 4,479 | 290 | 7% |
| TOTAL | | 24,885 | 27,096 | 29,838 | 2,742 | 10.1% |

Note 1 - Fiscal 16-17 and Fiscal 17-18 data obtained by Student Financial Services from York University's Quick-Facts data as published by the Office of Institutional Planning and Analysis (OIPA)

Note 2 – Number of recipients does not reflect 'unique' heads; some students may have received more than one award and may be included in more than one category.

Summary of Year of Year Variances

York Funded – Entering Student Awards

| York Funded Entering Student Awards | YOY Variance | | Average YOY Impact of Award (\$) per Recipient | | |
|-------------------------------------|--|--|--|--|---|
| | Fiscal 16-17 vs. Fiscal 17-18 YOY Variance (\$) | Fiscal 16-17 v.s. Fiscal 17-18 YOY Variance (%) | Fiscal 16-17 (Average) Award Disbursement per Recipient* | Fiscal 17-18 (Average) Award Disbursement per Recipient* | YOY Variance (\$) |
| Overall Spending (\$) | \$1.3M ↘ | -11.9% ↘ | \$1,018 | \$808 | -\$210 ↘ |
| Overall Headcount (#) | 1167 ↗ | 10.9% ↗ | | | |

*Calculated as total spending in the Award Category for the academic year divided by the # of Students who Received this Award Category during the academic year

Overall, disbursement (spending) on **York Funded Entering Student Awards** decreased by **-\$1.3M** (Fiscal 16-17: \$10.9M vs. Fiscal 17-18: \$9.6M), representing a year-over-year (“YOY”) spending variance of **-11.9%**. Based on recipient headcount, there was a **10.9% increase** on a year over year basis (Fiscal 16-17: 10,707 vs. Fiscal 17-18:11,874). The YOY average award disbursed decreased by approximately **-\$210 per recipient**.

Overall, there was a **-\$1.7M** drop in entrance scholarships expenditures of which **\$1.45M** is attributed to an institutional decision to drop the scholarship values for the York University Automatic Entrance Scholarship by **\$500** at all tiers except for students admitted with averages of **95%+**. In 16-17, the scholarships were disbursed at values ranging from **\$1,000** to **\$3,500** (i.e. 80% to 84.9% = \$1000, 85% to 89.9% = \$1500, 90% to 94.9% = \$2500, and 95%+ = \$3,500). In 17-18, the scholarships were disbursed at values ranging from **\$500** to **\$3,500** (i.e. 80% to 84.9% = \$500, 85% to 89.9% = \$1000, 90% to 94.9% = \$2000, and 95%+ = \$3,500). These scholarships are given to domestic high school admits and international high school admits who completed their high school studies in a Canadian curriculum in conjunction with the Student Life Award valued at **\$500**. The Automatic Entrance Scholarship is non-renewable except for those students admitted with a final average of **95%+**.

The balance of the drop is attributed to a **-\$166.5K** decrease in the Provost Scholarship (discontinued), an **-\$81K** drop in the International Engineering Entrance Supplement and a **-\$60K** drop in the LA&PS World Scholars Entrance Scholarship; the latter two scholarships were offered on a one-time only basis for the 16-17 admission cycle.

These drops were offset by increases in other entrance scholarships such as the Provost Award (replaced the Provost Scholarship) which was launched in for the 17-18 admission cycle. The previous scholarship (Provost Scholarship) valued at **\$1000**, was awarded to College transfer students who had completed two full semesters of academic study in the college system with an overall grade point average of **‘A’**. To increase enrolment numbers amongst college and university transfer applicants, the Provost Award was established which is open to both college and university transfer applicants who meet similar criteria. Dependent on the applicant’s admission average, the award is valued at **\$500** or **\$1000**. For Fiscal 17-18, there was an increased spend of **\$361K** attributed to this award.

In addition, there was an increased spend of **\$43K** for the Student Life Award and a **13.4%** increase (Fiscal 16-17: 164 recipients vs. Fiscal 17-18: 186 recipients) in the number of students who qualified for the Lassonde Entrance Scholarship and the Faculty of Science Scholarship resulting in an additional spend of **\$43.5K**. These scholarships, valued at **\$2000**, are automatically awarded to students admitted to these faculties with averages of **90%** and higher.

In summary, while overall spending decreased, the number of recipients of entrance awards increased in Fiscal 17-18 versus Fiscal 16-17.

York Funded - Continuing Student Awards

| York Funded Continuing Student Awards | YOY Variance | | Average YOY Impact of Award (\$) per Recipient | | |
|---------------------------------------|--|--|--|--|-------------------|
| | Fiscal 16-17 vs. Fiscal 17-18 YOY Variance (\$) | Fiscal 16-17 v.s. Fiscal 17-18 YOY Variance (%) | Fiscal 16-17 (Average) Award Disbursement per Recipient* | Fiscal 17-18 (Average) Award Disbursement per Recipient* | YOY Variance (\$) |
| Overall Spending (\$) | \$425K ↓ | -3.5% ↓ | \$1,011 | \$900 | -\$111 ↓ |
| Overall Headcount (#) | 931 ↑ | 8.3% ↑ | | | |

*Calculated as total spending in the Award Category for the academic year divided by the # of Students who Received this Award Category during the academic year

Overall, disbursement (spending) on **York Funded Continuing Student Awards** *decreased* by -\$425K on a year-over-year basis (Fiscal 16-17: \$11.4M vs. Fiscal 17-18: \$11M) representing a YOY spending variance of -3.5%.

Based on recipient headcount for York Funded Continuing Student Awards, there was an 8.3% YOY *increase* in students (+931 students) receiving awards in this category (Fiscal 16-17: 11,275 students vs. Fiscal 17-18: 12,206 students). The YOY average award disbursed *decreased* by approximately \$111 per recipient.

Changes in recent years to the Entrance Scholarship Program have contributed to the drops in expenses in this category. The current program which was launched for the Fall/Winter 2015-2016 admission cycle included the elimination of a renewable entrance scholarships for students admitted with averages from 80% to 94.9%. Instead, students who achieve a sessional grade point average of 8.00 or higher after the completion of 24 York credits are awarded the *York University Continuing Student Scholarship*. Students who were admitted prior to the launch of the new program were grand-parented under the previous renewable entrance scholarship program. This resulted in a \$184.5K drop in expenses under the Renewable Entrance Scholarship which was partially offset by a \$148K increase in the amount of funds disbursed through the YU Continuing Student Scholarship for Fiscal 17-18 (Fiscal 16-17: \$1.07M, 1813 recipients vs. Fiscal 17-18: \$1.2M, 2043 recipients).

Another source of the decreased spending in this category is attributed to a \$451K decrease in expenditures under the York University Undergraduate Bursary program (Fiscal 16-17: \$8.6M vs. Fiscal 17-18: \$8.2M). Bursary disbursements were impacted in Fiscal 17-18 by the labour disruption. Typically, York disburses all available funding within the applicable fiscal year however with the start of the labour disruption in March 2018, a decision was made to defer \$500K of available bursary funds to the next fiscal cycle (18-19) to provide support to students experiencing financial hardship because of the strike.

In summary, while overall spending decreased, the number of recipients increased in Fiscal 17-18 versus Fiscal 16-17 for York Funded Continuing Student Awards. Furthermore, had it not been for the labour disruption spending in this category would have remained static.

Government Funded Awards

| Government Funded | YOY Variance | | Average YOY Impact of Award (\$) per Recipient | | |
|-----------------------|--|--|---|---|-------------------|
| | Fiscal 16-17 vs. Fiscal 17-18 YOY Variance (\$) | Fiscal 16-17 v.s. Fiscal 17-18 YOY Variance (%) | Fiscal 16-17 (Average) Award Disbursement per Recipient* | Fiscal 17-18 (Average) Award Disbursement per Recipient* | YOY Variance (\$) |
| | Overall Spending (\$) | \$340K ↓ | -19% ↓ | \$1,946 | \$1,138 |
| Overall Headcount (#) | 354 ↑ | 38.3% ↑ | | | |

*Calculated as total spending in the Award Category for the academic year divided by the # of Students who Received this Award Category during the academic year

Overall, disbursement (spending) on **Government Funded Awards** decreased by \$340K on a YOY-basis (Fiscal 16-17: \$1.8M vs. Fiscal 17-18: \$1.46M); or a spending variance of 18.9%.

Based on recipient headcount for Government Funded Awards, there was a 38.3% increase (+354 students) receiving awards in this category (Fiscal 16-17: 925 students vs. Fiscal 17-18: 1279). It should be noted it is common for the same student to receive multiple payments under the government programs that are counted individually in the headcount, so the indicated increase is misleading.

When analyzing the average award disbursement per recipient, the YOY decrease was approximately -\$808 per student.

A substantial portion of the decreased expenses in the Government Funded Awards category is attributed to a -\$293K drop in disbursements in the *Ontario Bridging Participant Assistance Program (OBPAP) Tuition Waiver* and the *Internationally Educated Professionals (IEP) Bridging Program Tuition Waiver*. These government funded programs provide tuition assistance to students with financial need enrolled in approved bridge training programs. There were no new students admitted for the 2017-2018 program as the program was awaiting a new contract from the Ministry of Citizenship which was not issued until April 2018. Consequently, there was a significant decline in enrolments YOY (FW16-17: 148 students vs. FW17-18: 61 students).

Another program that contributed to the decline in disbursements is the Bursary for Students with Disabilities which dropped by -\$108K (FW16-17: \$814K vs. FW17-18: \$706K). This bursary is intended to help students with disabilities to meet disability-related costs incurred while participating in post-secondary education and is application based.

There was also a decrease of -\$36K (FW16-17: \$72K for 12 students vs. FW17-18: \$36K for 5 students) in disbursements from the Global Affairs Scholarship which is given to incoming exchange students.

These drops were partially offset by an increase in students participating in the *NSERC Undergraduate Student Research* program (Fiscal 16-17: 44 students vs. Fiscal 17-18: 54 students). This program supports York's research culture by providing undergraduate students with opportunities to gain paid research experience in an academic setting. The program is intended to encourage undergraduate students to undertake graduate studies and pursue research careers in the natural science and engineering fields. The YOY variance in spending for this program was \$84K (FW16-17: \$258K vs FW17-18: \$343K).

In general spending and disbursements in Government Funded Awards is driven by the funding directives of the provincial government (MTCU) and by pool of students who apply and qualify for these government programs. Therefore, the amount (\$) and headcount variances can change from year to year and are not explicitly tied to York University's scholarship strategy.

Awards from Endowments and Private Donations

| Endowments and Donations | YOY Variance | | Average YOY Impact of Award (\$) per Recipient | | |
|--------------------------|--|--|--|--|--|
| | Fiscal 16-17 vs. Fiscal 17-18 YOY Variance (\$) | Fiscal 16-17 v.s. Fiscal 17-18 YOY Variance (%) | Fiscal 16-17 (Average) Award Disbursement per Recipient* | Fiscal 17-18 (Average) Award Disbursement per Recipient* | YOY Variance (\$) |
| Overall Spending (\$) | \$87K ↗ | 1.3% ↗ | \$1,671 | \$1,583 | -\$88 ↘ |
| Overall Headcount (#) | 290 ↗ | 7.0% ↗ | | | |

*Calculated as total spending in the Award Category for the academic year divided by the # of Students who Received this Award Category during the academic year

Overall, disbursement (spending) on Private Donations and Endowments *increased* by \$87K on a year-over-year basis (Fiscal 16-17: \$7M vs. Fiscal 17-18: \$7.09M); representing a YOY disbursement (spending) variance of 1.3%.

Based on recipient headcount, there was a year over year 7% *increase* (of 290 students) receiving awards in this category (Fiscal 16-17: 4,189 students vs. Fiscal 17-18: 4,479).

Though the overall YOY spending *increased* as did the YOY number of recipients, the average award value received per recipient in Fiscal 17-18 *decreased* by an average of \$88 per recipient.

There were numerous individual awards that saw increases in year over year spending or were new in the Fiscal 17-18 year resulting in increased disbursements of \$359K. These include but are not limited to the following:

- *Lassonde Scholarship* (YOY disbursement increase of \$55K)
- *Ethel Harris Entrance Scholarship at Glendon College* (YOY disbursement increase of \$45K)
- *Students' Centennial Bursary Fund* (YOY disbursement increase of \$41.7K)
- *Harley D. Hallet Renewable Entrance Scholarship* (YOY disbursement increase of \$40K)
- *McCarthy Tetrault Business Law Internship* (YOY disbursement increase of \$40K)
- *Michael H. Lawee Memorial Awards in Science and Engineering* (YOY disbursement increase of \$30K)
- *Dean's Undergraduate Research Award* (disbursed \$29K, new in 2017)
- *The Honderich Bursary* (YOY disbursement increase of \$28K)
- *Faculty of Liberal Arts and Professional Studies Entrance Award* (YOY disbursement increase of \$25.5K)
- *President Emeritus Mamdouh Shoukri International Award for Global Health* (disbursed \$25K, new in 2017)

These increases were offset by a \$261K drop in disbursements from a variety of awards that were disbursed in 16-17 fiscal year but not in the 17-18 fiscal year such as the Exchange Travel Bursary (-\$162K); the 50th Anniversary Bursary Program for Business and Engineering (-\$45K); the Stavros Niarchos Foundation Undergraduate Exchange Scholarship (-\$26K); the Sterling Voice Award (-14K) and the Joseph and Josephine Webber Memorial Fund for International Education (-\$13.7K).

In general year over year variances in disbursements and headcount are attributed to a variety of factors such as awards expiring from one year to the next, new awards becoming active, disbursement of surplus funding or awards not being disbursed in any given year due to inability to find suitable candidates.

In summary, there has been continuous year over year growth both in the amount of funding disbursed and the number of recipients in the Private Donations and Endowments categories.

Conclusion

Overall disbursement (spending) decreased on a YOY fiscal basis (Fiscal 16-17: \$31.1M vs. Fiscal 17-18: \$29.1M), representing a YOY spending variance of -6.4%.

Based on recipient headcount, there was an 10.1% increase (of 2,742 students) receiving awards (Fiscal 16-17: 27,096 students vs Fiscal 17-18: 29,838 students).

The overall YOY average of the award per student *decreased* by approximately \$172 per student (average award per recipient in Fiscal 16-17 = \$1,148 vs. Fiscal 17-18 = \$976).

Student Financial Services (SFS) has been actively conducting meetings with all faculties, colleges and relevant units/departments to review awards processes and ensure compliance with Senate guidelines. In addition, SFS is reviewing the disbursement rates of individual faculties and/or units and has flagged cost centres that have surpluses to ensure plans are in place to disburse the funds or re-invest them. Other items that are being addressed include the reporting of awards for OSAP students, audit requirements and the retention of documents in accordance with the Records and Information Management policies.

Overall Disbursement Rates by Faculty

Institutionally, York University had an overall disbursement rate (of available in year funding) of 85% for Fiscal 2017-2018 vs. 99% for Fiscal 2016-2017. This includes all funding for undergraduate and graduate students. The drop can be largely attributed to three graduate awards that saw a significant decline in disbursements from 16-17 to 17/18.

Based on recipient headcount, the unique numbers by faculty are as indicated below.

Fiscal 2017-2018

| Faculties | Unique heads by Faculty 2017-2018 | Unique award recipients by Faculty 2017-2018 | % by Faculty 2017-2018 |
|---|--------------------------------------|--|---------------------------|
| Liberal Arts & Professional Studies | 24,805 | 6,704 | 27% |
| Environmental Studies | 572 | 199 | 35% |
| Science | 4,640 | 1,533 | 33% |
| Health | 11,248 | 3,837 | 34% |
| Education | 1,329 | 471 | 35% |
| Glendon | 2,754 | 1,056 | 38% |
| Arts, Media, Performance and Design | 2,989 | 1,298 | 43% |
| Lassonde | 3,525 | 1,524 | 43% |
| Schulich | 1,884 | 1,056 | 56% |
| Osgoode | 990 | 722 | 73% |
| TOTAL | 54,736 | 18,400 | 34% |
| Note 1 - Faculty enrolment numbers obtained from York University's quick-facts data (published by the Office of Institutional Planning and Analysis) | | | |
| Note 2 - Fiscal year refers to May 1, 2017 to April 30, 2018 | | | |

Fiscal 2016-2017

| Faculties | Unique heads by Faculty 2016-2017 | Unique award recipients by Faculty 2016-2017 | % by Faculty 2016-2017 |
|---|--------------------------------------|--|---------------------------|
| Liberal Arts & Professional Studies | 25,103 | 7,072 | 28% |
| Environmental Studies | 571 | 186 | 33% |
| Science | 4,244 | 1,422 | 34% |
| Health | 11,135 | 4,028 | 36% |
| Education | 1,181 | 449 | 38% |
| Glendon | 2,938 | 1,222 | 42% |
| Arts, Media, Performance and Design | 2,935 | 1,313 | 45% |
| Lassonde | 2,946 | 1,407 | 48% |
| Schulich | 1,864 | 1,121 | 60% |
| Osgoode | 972 | 673 | 69% |
| TOTAL | 53,889 | 18,893 | 35% |
| Note 1 - Faculty enrolment numbers obtained from York University's quick-facts data (published by the Office of Institutional Planning and Analysis) | | | |
| Note 2 - Fiscal year refers to May 1, 2016 to April 30, 2017 | | | |

Considerations and New Developments

Labour Disruption Bursary

Bursary funds were made available by the University to provide support to undergraduate students (domestic and international) who may have experienced financial hardship because of the labour disruption. It was managed and disbursed by the Scholarship and Bursary unit. Expenses that were considered included but were not limited to the following: additional rent and living expenses incurred because of the extended study period, costs associated with changes to or cancellation of travel plans, loss of income and additional child care costs. The total impact of the bursary was approximately \$950K. These bursary expenses will be reflected in the 18/19 disbursement report as the bulk of the assessments occurred after the fiscal 17/18-year end.

OSAP and Government Funded Programs

On January 17th, the Government of Ontario announced changes that will have a significant impact on universities and colleges. These changes include the following:

1. Under the new Tuition Fee Framework, colleges and universities are required to reduce tuition fee levels by 10 percent in 2019-20, relative to 2018-19 levels.
2. Under the new Tuition Fee Framework, colleges and universities are expected to maintain tuition fee levels in 2020-21 at the same level as 2019-20 tuition.
3. The introduction of an Ancillary Fee Classification Framework that will establish the types of ancillary fees institutions may or may not charge on a mandatory basis.
4. Changes in eligibility for OSAP grants and repayment of Ontario student loans.
 - Elimination of the non-needs based component of the Ontario Student Grant (OSG)
 - Ontario grant support for students from families earning more than \$140,000/year and single students earning more than \$120,000/year will be eliminated
 - Expected parental contributions for OSAP will increase and be based on the same rates that were in place in the 2017-18 academic year.
 - Students who have been out of high school for less than six years will be considered dependent for the purpose of OSAP so parental income will be factored into their OSAP need assessment.
 - Students from low-income families will now receive a minimum of 10% loan from Ontario rather than 0% under current program rules. The share of loan a student receives will increase with income.
 - Ontario will remove the interest-free grace period for borrowers.

**2017/18
Undergraduate
Awards - Table A
for Quick-Facts**

level Undergrad

| | | | All |
|-------------------|---------------------------|--|--------------|
| York Funded | Entering Student Awards | Entrance Award | \$3,717,557 |
| | | Other Entrance Scholarships | \$5,217,655 |
| | | President's Scholarship | \$270,000 |
| | | Renewable Entrance Scholarship | \$12,000 |
| | | Science & Engineering Entrance Scholarship | \$372,000 |
| | Continuing Student Awards | Continuing Student Scholarship | \$1,218,243 |
| | | Other In-Course Scholarships | \$975,033 |
| | | Renewable Entrance Scholarship-Renewals | \$574,500 |
| | | Service Bursary Program | \$28,733 |
| | | Undergrad Bursary Program | \$8,191,473 |
| Government Funded | | First Generation Bursary | \$185,718 |
| | | Government Funded Programs | \$564,019 |
| | | OSAP Disability Bursary | \$706,037 |
| Private Donations | | Endowments and Annual Donations | \$7,089,428 |
| All | | | \$29,122,396 |

| | | | Home Faculty | | | | | | | | | | All | |
|-------------------|---------------------------|--|--------------|-------------|-----------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| | | | | AP | ED | ES | FA | GL | HH | LE | LW | SB | SC | |
| York Funded | Entering Student Awards | Entrance Award | \$1,324 | \$1,579,473 | \$36,830 | \$25,000 | \$294,674 | \$172,070 | \$611,057 | \$334,671 | \$29,123 | \$240,500 | \$392,835 | \$3,717,557 |
| | | Other Entrance Scholarships | \$0 | \$1,517,291 | \$8,000 | \$22,500 | \$597,664 | \$389,500 | \$583,238 | \$491,173 | \$0 | \$1,020,500 | \$587,789 | \$5,217,655 |
| | | President's Scholarship | \$0 | \$70,200 | \$0 | \$16,200 | \$54,000 | \$16,200 | \$48,600 | \$5,400 | \$0 | \$37,800 | \$21,600 | \$270,000 |
| | | Renewable Entrance Scholarship | \$0 | \$0 | \$0 | \$0 | \$0 | \$4,000 | \$4,000 | \$0 | \$0 | \$0 | \$4,000 | \$12,000 |
| | | Science & Engineering Entrance Scholarship | \$0 | \$2,000 | \$0 | \$0 | \$0 | \$0 | \$0 | \$133,000 | \$0 | \$0 | \$237,000 | \$372,000 |
| | Continuing Student Awards | Continuing Student Scholarship | \$0 | \$326,078 | \$11,616 | \$14,344 | \$55,869 | \$60,334 | \$476,311 | \$48,675 | \$0 | \$76,362 | \$148,654 | \$1,218,243 |
| | | Other In-Course Scholarships | \$0 | \$193,384 | \$23,237 | \$19,050 | \$33,452 | \$124,463 | \$112,199 | \$207,146 | \$209,779 | \$19,750 | \$32,573 | \$975,033 |
| | | Renewable Entrance Scholarship-Renewals | \$0 | \$48,500 | \$10,000 | \$2,000 | \$42,500 | \$71,500 | \$82,000 | \$12,500 | \$1,000 | \$180,000 | \$124,500 | \$574,500 |
| | | Service Bursary Program | \$0 | \$1,381 | \$0 | \$0 | \$0 | \$25,352 | \$0 | \$0 | \$0 | \$2,000 | \$0 | \$28,733 |
| | | Undergrad Bursary Program | \$0 | \$1,763,169 | \$154,008 | \$34,141 | \$635,690 | \$167,971 | \$841,348 | \$1,184,618 | \$2,928,372 | \$310,995 | \$171,161 | \$8,191,473 |
| Government Funded | | First Generation Bursary | \$0 | \$66,479 | \$0 | \$0 | \$8,377 | \$1,609 | \$16,631 | \$76,200 | \$0 | \$12,704 | \$3,718 | \$185,718 |
| | | Government Funded Programs | \$4,219 | \$100,226 | \$2,279 | \$7,148 | \$6,188 | \$50,810 | \$63,116 | \$80,667 | \$17,400 | \$7,200 | \$224,767 | \$564,019 |
| | | OSAP Disability Bursary | \$0 | \$334,391 | \$16,332 | \$11,645 | \$38,730 | \$39,095 | \$159,302 | \$31,257 | \$37,525 | \$10,000 | \$27,760 | \$706,037 |
| Private Donations | | Endowments and Annual Donations | \$0 | \$1,435,688 | \$155,255 | \$130,513 | \$493,536 | \$556,062 | \$758,294 | \$952,758 | \$1,681,062 | \$531,407 | \$394,853 | \$7,089,428 |
| All | | | \$5,543 | \$7,438,260 | \$417,557 | \$282,541 | \$2,260,680 | \$1,678,966 | \$3,756,097 | \$3,558,066 | \$4,904,260 | \$2,449,218 | \$2,371,210 | \$29,122,396 |

| | | | Home Faculty | | | | | | | | | | All | |
|-------------------|---------------------------|--|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | AP | ED | ES | FA | GL | HH | LE | LW | SB | SC | |
| | | | heads | heads | heads | heads | heads | heads | heads | heads | heads | heads | heads | heads |
| York Funded | Entering Student Awards | Entrance Award | 1 | 2882 | 74 | 46 | 609 | 332 | 1233 | 651 | 9 | 468 | 788 | 7093 |
| | | Other Entrance Scholarships | 0 | 1617 | 6 | 26 | 491 | 270 | 675 | 452 | 0 | 463 | 540 | 4540 |
| | | President's Scholarship | 0 | 13 | 0 | 3 | 10 | 3 | 9 | 1 | 0 | 7 | 4 | 50 |
| | | Renewable Entrance Scholarship | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 3 |
| | | Science & Engineering Entrance Scholarship | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 67 | 0 | 0 | 118 | 188 |
| | Continuing Student Awards | Continuing Student Scholarship | 0 | 624 | 23 | 29 | 98 | 107 | 745 | 81 | 0 | 126 | 229 | 2062 |
| | | Other In-Course Scholarships | 0 | 283 | 34 | 34 | 56 | 184 | 123 | 128 | 157 | 28 | 32 | 1059 |
| | | Renewable Entrance Scholarship-Renewals | 0 | 24 | 4 | 1 | 15 | 24 | 39 | 5 | 1 | 57 | 47 | 217 |
| | | Service Bursary Program | 0 | 11 | 0 | 0 | 0 | 80 | 0 | 0 | 0 | 1 | 0 | 92 |
| | | Undergrad Bursary Program | 0 | 2832 | 262 | 86 | 692 | 330 | 1722 | 1229 | 753 | 496 | 374 | 8776 |
| Government Funded | | First Generation Bursary | 0 | 56 | 0 | 0 | 6 | 2 | 18 | 54 | 0 | 12 | 4 | 152 |
| | | Government Funded Programs | 3 | 292 | 3 | 5 | 5 | 29 | 51 | 39 | 3 | 1 | 148 | 579 |
| | | OSAP Disability Bursary | 0 | 254 | 10 | 6 | 35 | 35 | 113 | 28 | 25 | 3 | 39 | 548 |
| Private Donations | | Endowments and Annual Donations | 0 | 1305 | 121 | 54 | 365 | 452 | 588 | 246 | 935 | 227 | 186 | 4479 |
| All | | | 4 | 10196 | 537 | 290 | 2382 | 1849 | 5317 | 2981 | 1883 | 1889 | 2510 | 29838 |

Faculty of Graduate Studies

Report on Graduate Awards, 2017-2018

February 22, 2019

Overview

This report provides a summary of graduate award disbursement for Fiscal 2017-18 (May 1, 2017 to April 30, 2018), as well as the statistics of major external graduate scholarship and post-doctoral fellowship adjudication (competitions taking place during Fiscal 2017-18). Where possible, we included the data for the last seven years to the most recent year of 2017-18. Disbursement data (Sections 1 and 2 of External Award Trends as well as Internal Awards Trends) are compiled from statistics provided by OIPA, while competition results are based on FGS internal data.

Overall, the value of awards disbursed to graduate students in 2017-2018 was fairly comparable to that in the previous fiscal year. External awards slightly increased from 2016-17, while internal awards declined by 4.42%. The Faculty of Graduate Studies continues to be committed to supporting graduate students through the promotion of merit-based internal and external scholarships as well as the disbursement of need-based bursaries.

External Award Trends

1. General Overview of Disbursement

Table 1 shows that the value of external awards held by York University graduate students were slightly above \$11 million in total for the last two years, with the total number of awards remaining relatively consistent over the last four years. Chart 2 shows the breakdown of disbursement by funding agency. SSHRC scholarships accounted for more than half of all external graduate awards in 2017-18, followed by the Ontario Graduate Scholarships at 34% of the total.

Table 1: External Awards – All Graduate, 2011-2018

| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|------------------------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|
| Total Value of Awards | \$11,800,800 | \$8,930,924 | \$10,507,418 | \$10,346,946 | \$10,498,131 | \$11,081,878 | \$11,107,148 |
| Percentage Change | 10.4% | -24.3% | 17.7% | -1.5% | 1.5% | 5.6% | 0.2% |
| # of Awards | 852 | 690 | 818 | 829 | 816 | 818 | 809 |

Chart 1: External Awards – All Graduate, 2011-2018

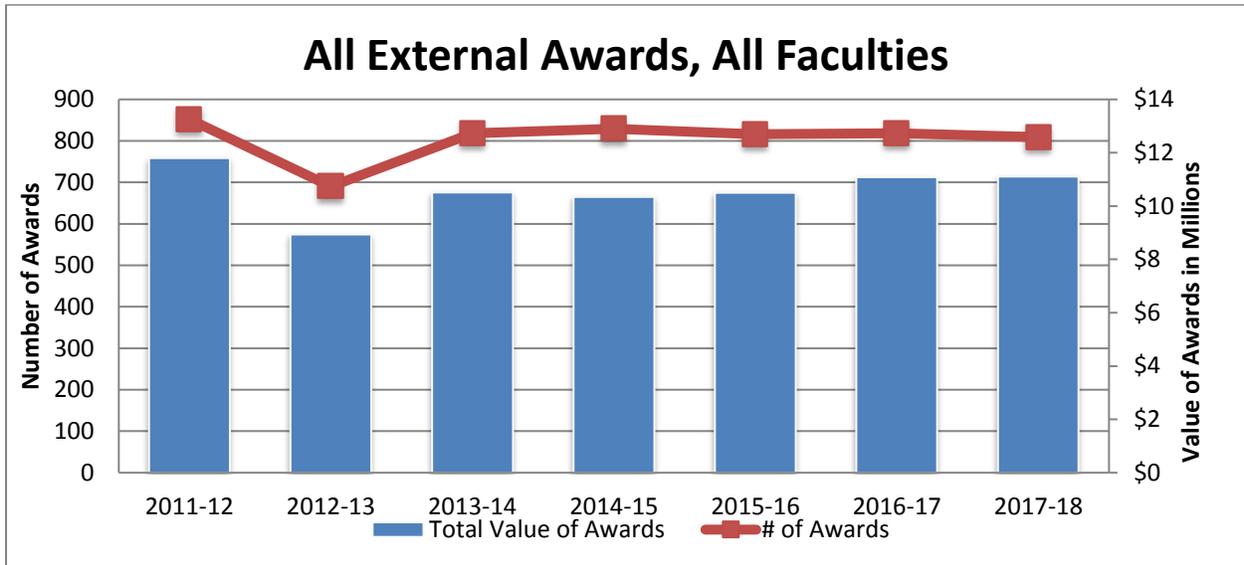
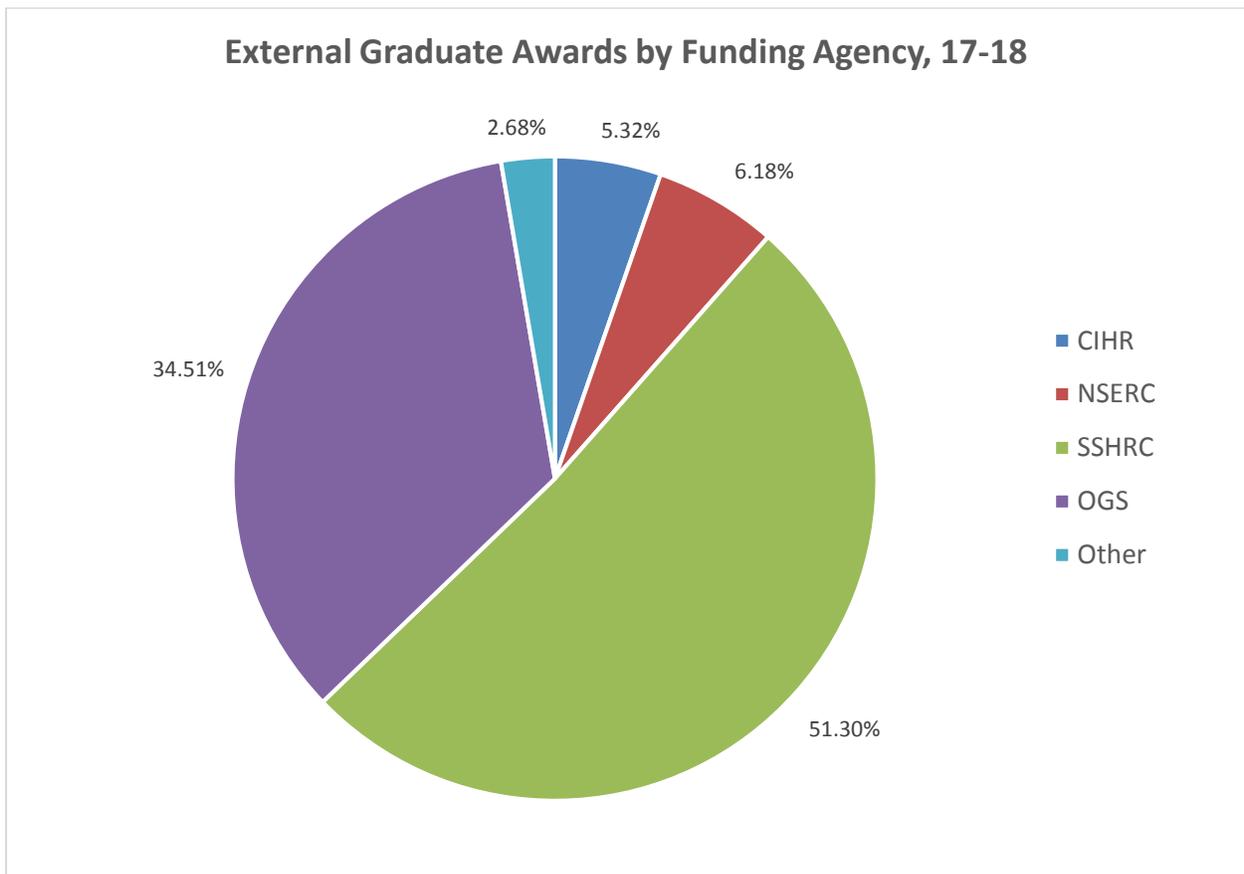


Chart 2: External Awards by Funding Agency, 2017-18



2. External Awards by Agency

CIHR:

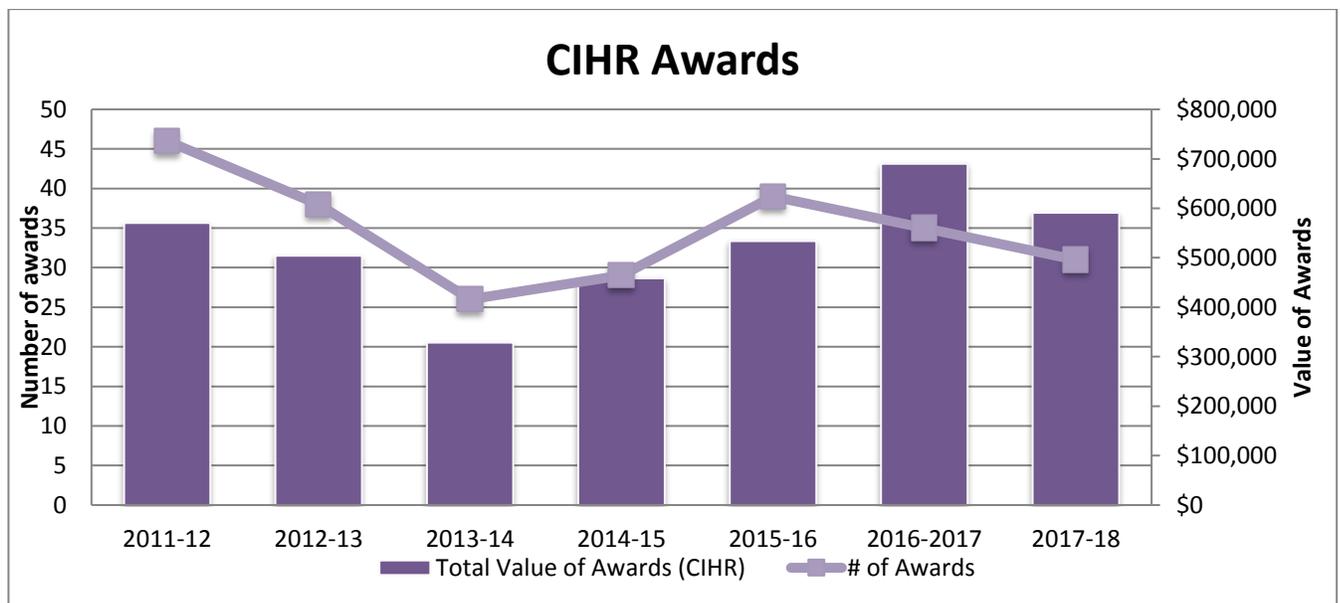
CIHR scholarships consist primarily of the CIHR Doctoral Award (\$35,000 per year for three years) and the Canada Graduate Scholarship Masters – CIHR (\$17,500 for one year). The level of CIHR funding saw a decline in 2017-18 after a steady increase for the previous three years. CIHR funding is relatively small compared to that of other federal granting agencies (NSERC and SSHRC) for two reasons. First, the master’s level funding has a limited quota at York, due to the quota allocation formula employed by the Tri-council (please see p. 9, section on Canada Graduate Scholarships – Masters for more detail). For Doctoral CIHR awards, there is no quota for the number of applications we may forward to the national level of competition in any given year, and we encourage all eligible and qualified students to submit an application. The number of awards available at the national level, however, is relatively small (152 CIHR doctoral awards in 2016-17 compared to 1290 awards for SSHRC in the same year, for example), which limits further funding increases for York students in the CIHR stream.

In addition to the regular Master’s level and doctoral CIHR awards, our graduate students also seek funding for smaller CIHR awards, such as travel grants, every year.

Table 2: External Awards – CIHR, 2011-2018

| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Total Award | \$570,294 | \$504,210 | \$328,586 | \$458,166 | \$533,620 | \$689,970 | \$590,834 |
| # of Awards | 46 | 38 | 26 | 29 | 39 | 35 | 31 |

Chart 3: CIHR Awards, 2011-2018



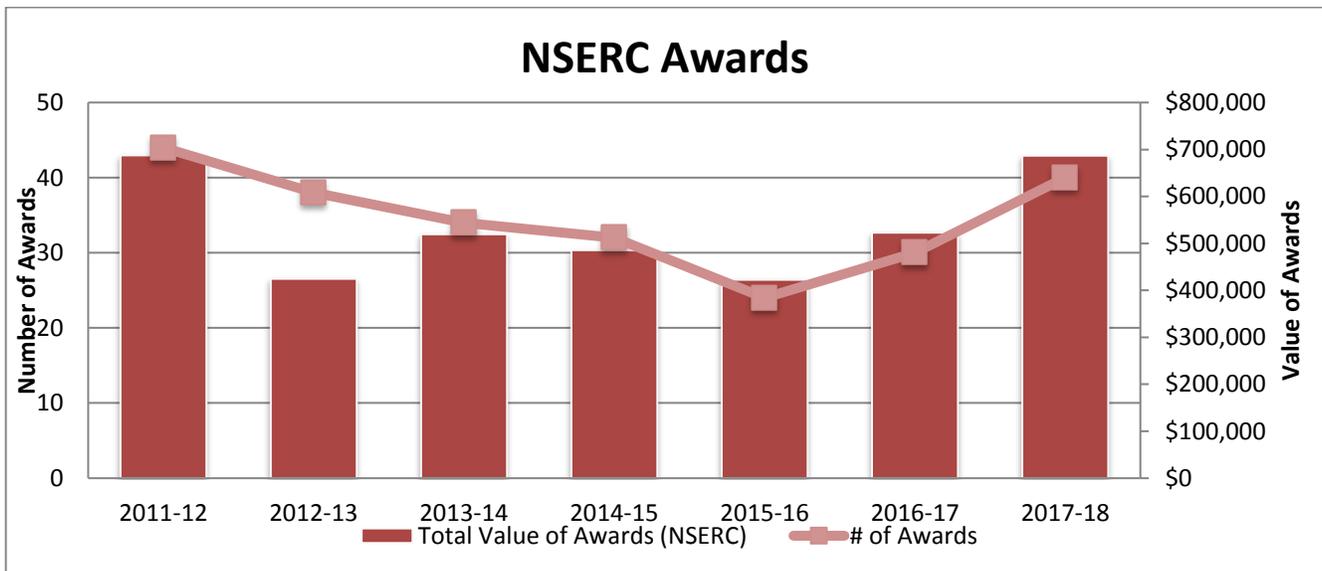
NSERC:

There are three main NSERC awards that account for the numbers below: the NSERC Canada Graduate Scholarship Doctoral (\$35,000 per year for two or three years), NSERC Postgraduate Scholarships (\$21,000 per year for two or three years), and NSERC Masters (CGS-M, \$17,500 for one year). Both the number and value of awards continued to increase in 2017-18 for NSERC funding. The number of students applying for the NSERC doctoral competition is on the rise and this stream of competition has seen a high success rate over the past three years. FGS continues to promote the award opportunities to graduate programs and directly to students through FGS newsletters, website, and grant-writing workshops.

Table 3: NSERC Awards, 2011-2018

| NSERC Award | | | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Total Value | \$687,727 | \$424,666 | \$519,326 | \$485,670 | \$422,332 | \$522,670 | \$686,498 |
| # of Awards | 44 | 38 | 34 | 32 | 24 | 30 | 40 |

Chart 4: NSERC Awards, 2011-2018



SSHRC:

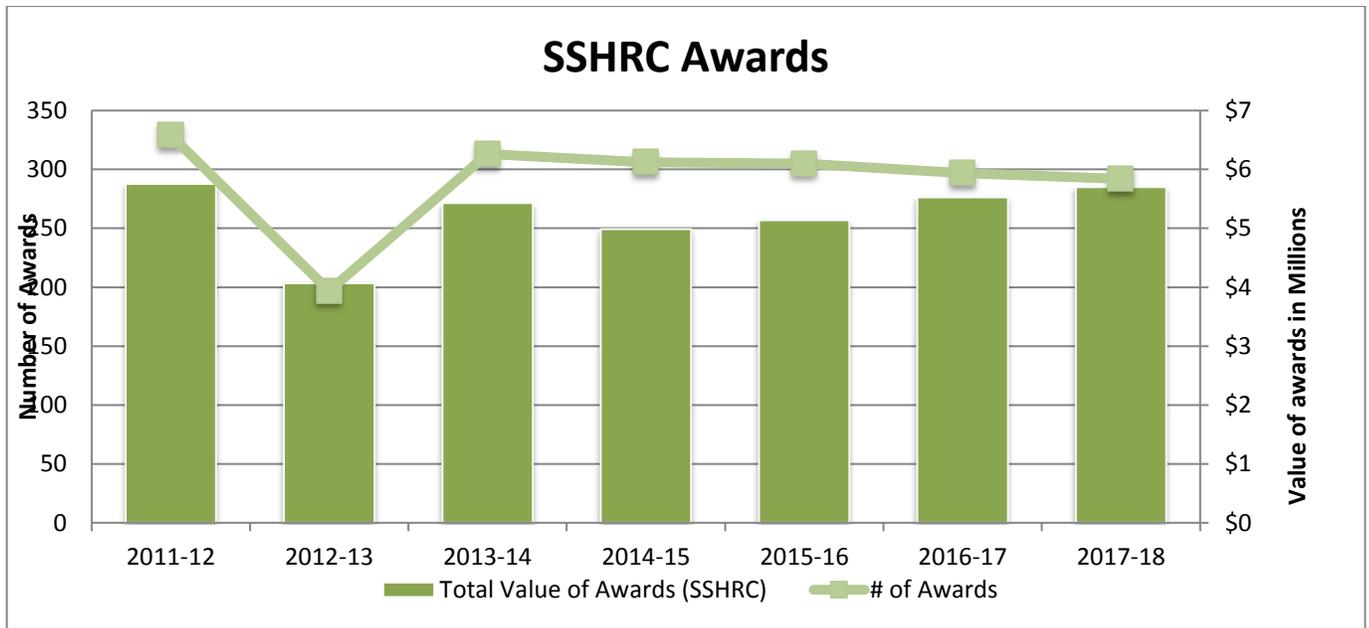
SSHRC awards consist primarily of three categories: SSHRC Canada Graduate Scholarship Doctoral (\$35,000 per year for three years), SSHRC Doctoral Fellowship (\$20,000 per year for up to four years), and SSHRC Masters

(CGS-M, \$17,500 for one year). SSHRC award value has also increased consecutively for the last three years, totaling over 5.6 million dollars in 2017-18. The funding level change was also positive for 2016-17 SSHRC awards, with the total value increasing by almost \$400,000 or by 7.0% in 2016-17. The strong performance at SSHRC doctoral award is notable, considering that the total numbers of SSHRC doctoral awards available nationally have been on a decline since 2014-15.

Table 4: External Awards – SSHRC, 2011-2018

| SSHRC Award | | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Total Value | \$5,750,910 | \$4,067,459 | \$5,427,877 | \$4,988,617 | \$5,135,839 | \$5,526,710 | \$5,698,335 |
| # of Awards | 329 | 197 | 313 | 306 | 305 | 297 | 292 |

Chart 5: SSHRC Awards, 2011-2018



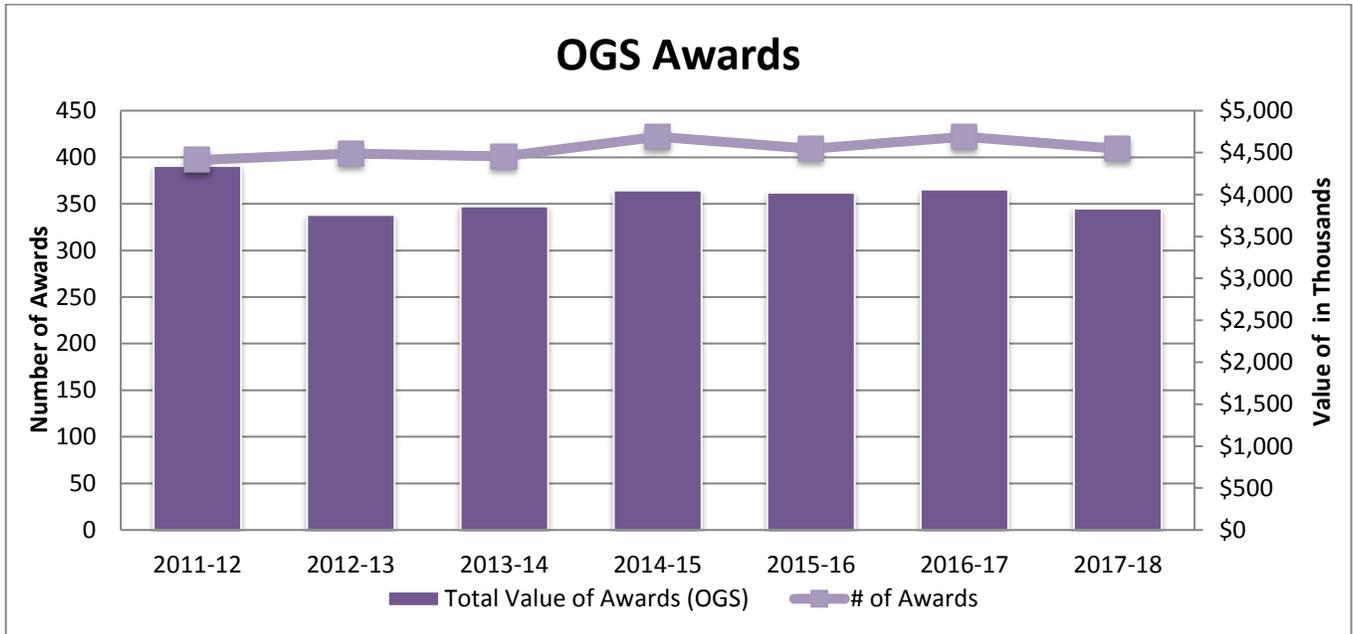
Ontario Graduate Scholarships (OGS):

Ontario Graduate Scholarships are the main provincial funding open to all full-time graduate students. Since the administration of the award is delegated to the university level several years ago, each university is allocated a quota for the number of awards that may be offered each year. FGS oversees the adjudication process, along with Tri-council award adjudication. The quota is determined based on enrollement, and it should be noted that the annual quota for York has decreased each year since 2014.

Table 5: OGS Awards, 2011-2018

| Award | Ontario Graduate Scholarship | | | | | | |
|-------------|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Total Value | \$4,340,833 | \$3,755,000 | \$3,859,988 | \$4,050,323 | \$4,023,094 | \$4,059,320 | \$3,833,314 |
| # of Awards | 397 | 404 | 401 | 422 | 409 | 422 | 409 |

Chart 6: OGS Awards, 2011-2018

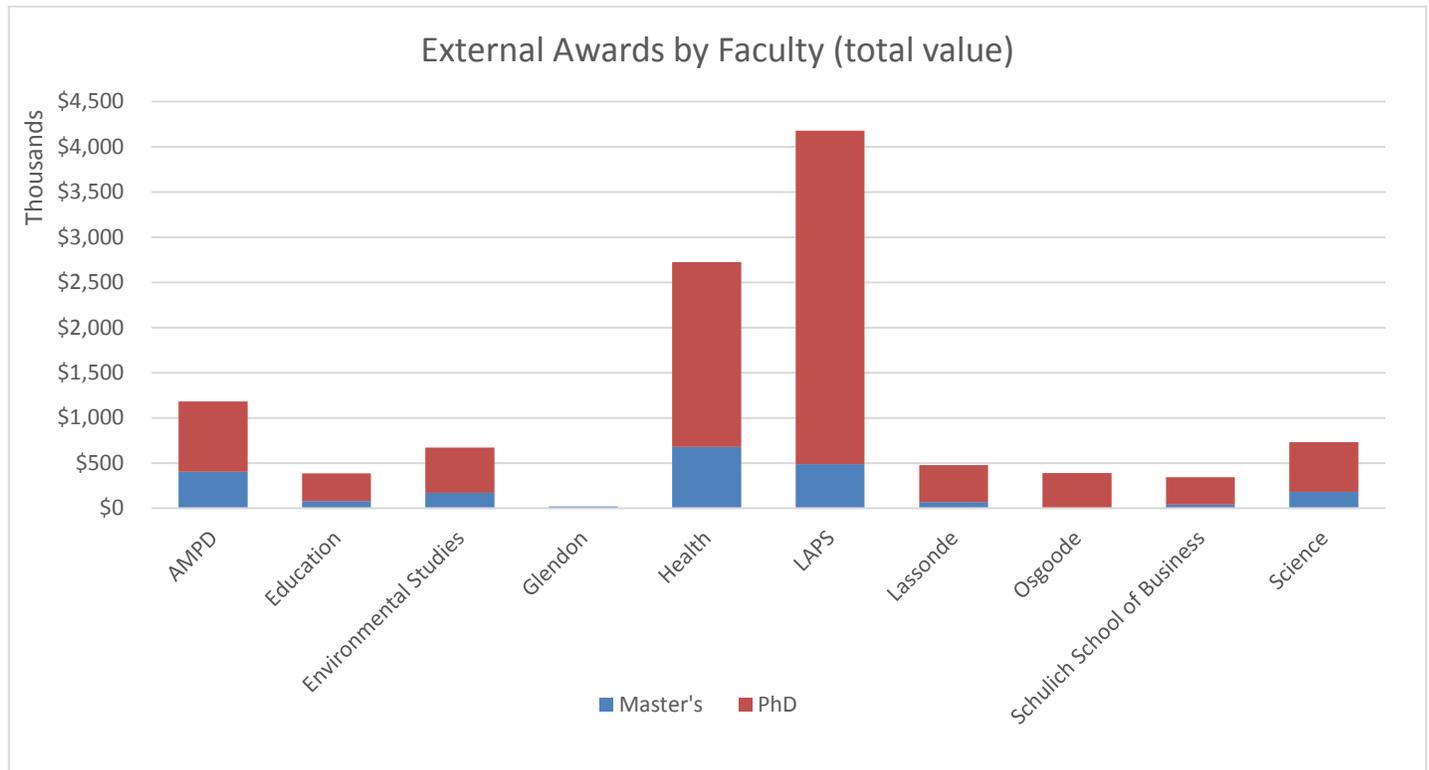


3. External Awards by Faculty and by Study Level

External awards data by study level show that over 80% of the total external funding is held by doctoral students. While the Faculty of Liberal Arts and Professional Studies drew most external awards in terms of the total value, on a FTE count basis, the Faculty of Health is most successful in obtaining external funding at both the Master's and doctoral levels. Note that the FTE counts below include all graduate students, including those in a number of professional (non-research based) programs such as the MBA and Osgoode Professional Development (OPD) programs. Since the majority of external awards are available for full-time students in research intensive programs, the proportion of non-research based or part-time students within the Faculty may be a factor in explaining the varying per FTE funding level by Faculty.

Table 6: External Awards by Faculty and by Study Level

| Faculty | Award value | | | FTE Count | | | Per FTE Funding | | |
|------------------------------------|-------------|-------------|--------------|------------|------------|--------|-----------------|------------|------------|
| | Master's | PhD | Total | Master's | PhD | Total | Master's | PhD | Total |
| AMPD | \$401,829 | \$779,996 | \$1,181,825 | 193.6 | 130 | 323.6 | \$2,075.56 | \$5,999.97 | \$3,652.12 |
| Education | \$78,334 | \$308,332 | \$386,666 | 153.2 | 80.3 | 233.5 | \$511.32 | \$3,839.75 | \$1,655.96 |
| Environmental Studies | \$170,002 | \$500,414 | \$670,416 | 208.8 | 67.6 | 276.4 | \$814.19 | \$7,402.57 | \$2,425.53 |
| Glendon | \$20,834 | \$ - | \$20,834 | 101 | 12.5 | 113.5 | \$206.28 | \$0.00 | \$183.56 |
| Health | \$676,168 | \$2,049,161 | \$2,725,329 | 245.9 | 256 | 501.9 | \$2,749.77 | \$8,004.54 | \$5,430.02 |
| LAPS | \$488,752 | \$3,689,497 | \$4,178,249 | 705.8 | 713.3 | 1419.1 | \$692.48 | \$5,172.43 | \$2,944.29 |
| Lassonde | \$67,668 | \$410,993 | \$478,661 | 118 | 119.1 | 237.1 | \$573.46 | \$3,450.82 | \$2,018.81 |
| Osgoode | \$5,000 | \$383,337 | \$388,337 | 252.2 | 52.8 | 305 | \$19.83 | \$7,260.17 | \$1,273.24 |
| Schulich School of Business | \$41,667 | \$303,332 | \$344,999 | 886.3 | 48.3 | 934.6 | \$47.01 | \$6,280.17 | \$369.14 |
| Science | \$181,665 | \$550,167 | \$731,832 | 165.7 | 203 | 368.7 | \$1,096.35 | \$2,710.18 | \$1,984.90 |
| Total (value) | \$2,131,919 | \$8,975,229 | \$11,107,148 | 3030.5 | 1682.9 | 4713.4 | \$703.49 | \$5,333.19 | \$2,356.50 |
| Total (%) | 19% | 81% | | 64% | 36% | | | | |

Chart 7: External Awards by Faculty and by Study Level

4. External Awards – Competition Results 2017-2018

Note: This section reports on scholarship competition results based on FGS internal data from each of the award competitions at both master's and doctoral levels. Most competitions take place a year in advance of the actual award start date and the recipients of the 17-18 usually start their funding in September 2018.

Master's Scholarships (Canada Graduate Scholarships – Masters)

Since 2014, the master's level Tri-council awards are harmonized into the Canada Graduate Scholarships—Master's program. The adjudication of the award is delegated to each university, based on the allocations given by each of the Tri-council. The allocations are calculated using each institution's proportion of the total sum of grant and award funding received by for both faculty and students at all institutions. The CGS – M program is expected to revise institutional allocations for the next scholarship competition cycle.

Table 7: CGS-M Quota, 2014-2019

| CGS-Masters – Quota | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
|----------------------------|---------|---------|---------|---------|---------|
| CIHR | 8 | 8 | 8 | 3 | 3 |
| NSERC | 6 | 6 | 6 | 11 | 11 |
| SSHRC | 78 | 78 | 79 | 71 | 71 |

Doctoral Scholarships

Tri-council doctoral scholarships continue to be adjudicated at the national level by each council. For NSERC and SSHRC, each institution is given a quota for the number of files that may be forwarded to the national level of adjudication, while no such quota exists for CIHR doctoral award adjudication. The Faculty of Graduate Studies is regularly in contact with the Tri-council program officers as well as our internal adjudication committees to ensure that our forwarded applications are the most competitive, following the council adjudication criteria.

Table 8: Tri-council Doctoral Quota and Successful Awards, 2014-2019

| | | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-2019 |
|--------------|------------------|-------------|-------------|-------------|-------------|-------------|
| CIHR | Submission Quota | n/a | n/a | n/a | n/a | n/a |
| | CIHR awards | 6 | 2 | 7 | 4 | 3 |
| | CIHR amount | \$630,000 | \$210,000 | \$735,000 | \$420,000 | \$315,000 |
| NSERC | Submission Quota | 13 | 12 | 12 | 12 | 14 |
| | NSERC awards | 5 | 3 | 10 | 7 | 10 |
| | NSERC amount | \$455,000 | \$189,000 | \$700,000 | \$546,000 | \$763,000 |
| SSHRC | Submission Quota | 101 | 102 | 102 | 105 | 108 |
| | SSHRC awards | 42 | 55 | 54 | 41 | 44 |
| | SSHRC amount | \$2,975,000 | \$4,395,000 | \$4,145,000 | \$3,080,000 | \$3,055,000 |

Internal Award Trends: 2011-12 to 2017-18

Note: All financial data contained in this Internal Awards section of the report is taken directly from the Factbook (i.e. provided by Office of Institutional Research and Analysis - OIPA). OIPA internal awards data include awards as well as bursaries and prizes.

While undertaking studies, thousands of York graduate students continue to benefit from donor-funded internal awards and bursaries. The Faculty of Graduate Studies continues to work actively with the Offices of Advancement and Student Financial Services to coordinate the establishment of new donor-funded awards as well as effective management of current awards in order to increase funding opportunity to York graduate students.

Adjudication of graduate internal awards involves graduate programs, Faculties, Organized Research Units (ORUs) as well as the FGS Award Committee. Each award is adjudicated based on the specific scope and criteria of the award, and all eligible students are encouraged to apply. A number of awards are designated for recruitment and are offered to outstanding prospective students, with the aim of converting the offer of admissions into acceptance.

Internal awards included in this section can be grouped into three categories: 1) bursaries whose selection criterion is financial need; 2) need based awards whose adjudication includes both the consideration of financial need and merit; and 3) merit-based awards whose adjudication criteria includes academic excellence and/or specific achievement.

In 2016-2017, York University introduced the York Graduate Fellowship as a part of the standing funding package for research-based graduate students. Since the Fellowship is counted towards the total internal award disbursement, the table below includes two separate sets of data to provide comparable statistics.

The total internal awards and bursaries, excluding the York Graduate Fellowship have been between \$15 - 17 million in the past seven years. The total value saw a decrease of approximately \$700,000, or 4.42% from 2016-17 to 2017-18.

Table 9: Internal Awards - all graduate 2011-2018

| Internal Awards - all graduate | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Fiscal Year | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Value of Awards - All | \$17,316,074 | \$15,492,679 | \$15,644,071 | \$15,054,420 | \$17,220,829 | \$27,229,497 | \$31,515,091 |
| YU Graduate Fellowships | - | - | - | - | - | \$ 11,236,234 | \$ 16,229,248 |
| Value of Awards exclu. Fellowships | \$ 17,316,074 | \$ 15,492,679 | \$ 15,644,071 | \$ 15,054,420 | \$ 17,220,829 | \$ 15,993,263 | \$ 15,285,843 |
| # of Awards | 4638 | 3806 | 3708 | 3795 | 4489 | 7011 | 6987 |

Chart 8: Internal awards – all graduate 2011-2018

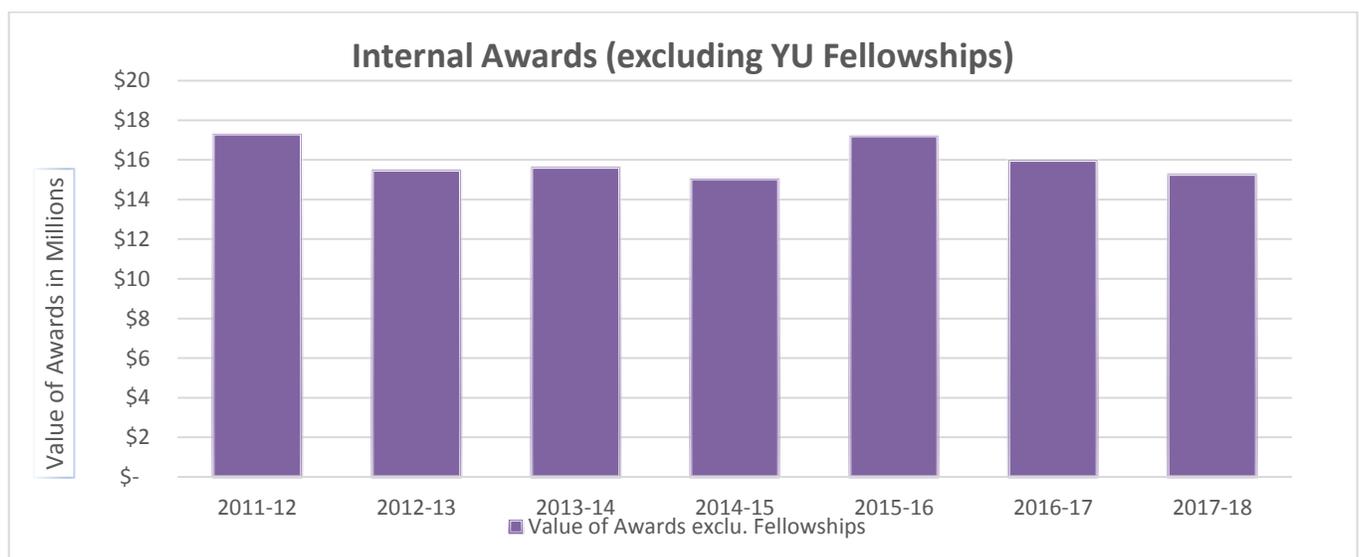
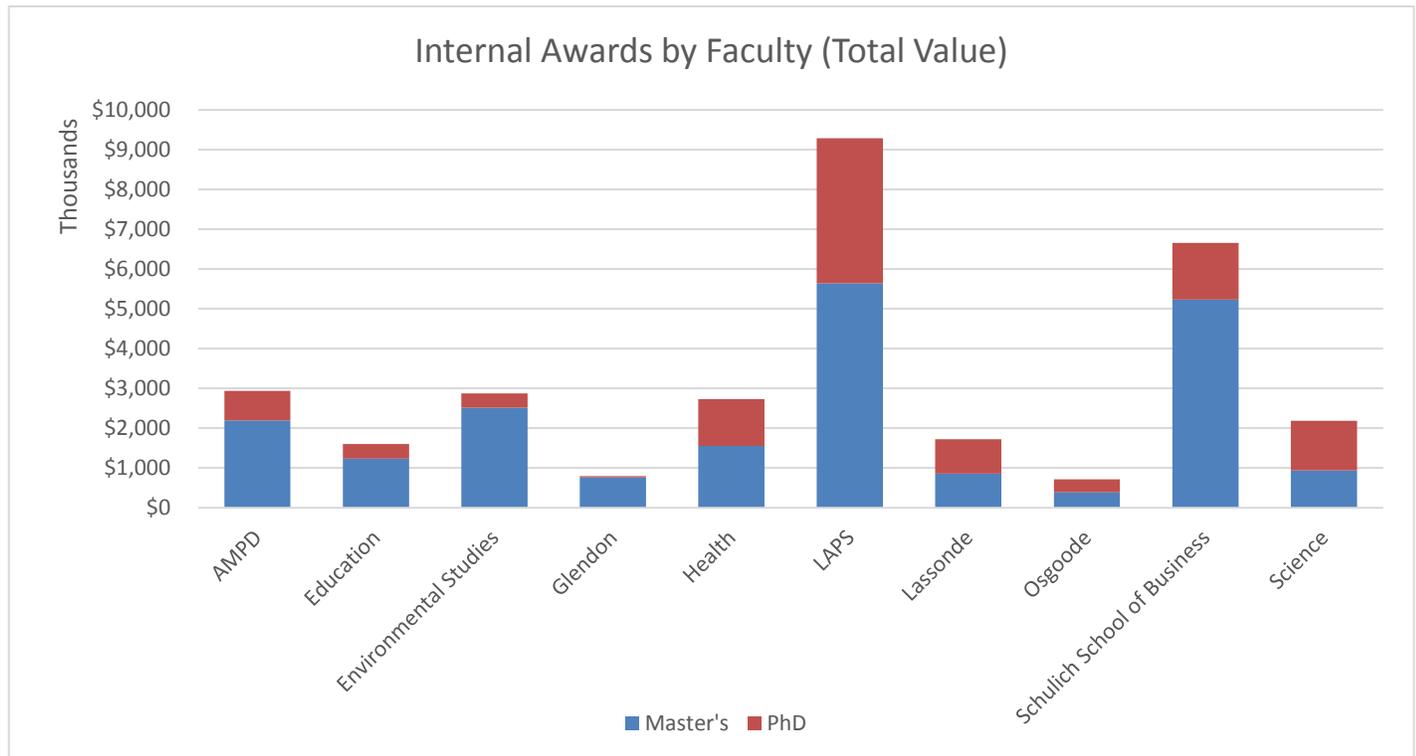


Table 10 below shows the internal funding level by Faculty and study level. The data show that, in contrast to external awards of which over 80% of the total went to doctoral students, Master's students as a whole held 68% of the total internal funding, and per FTE funding at the Master's level is higher than that of the doctoral level. One contributing factor for this is that the York Graduate Fellowship, which is counted in the internal funding below, is higher at the Master's level (10K) when not offset by external scholarships than the doctoral (5.5K on average in association with employment wages).

Table 10: Internal Funding by Faculty and by Study Level (including York Graduate Fellowships)

| Faculty | Award value | | | FTE Count | | | Per FTE Funding | | |
|------------------------------------|--------------|--------------|--------------|------------|------------|--------|-----------------|-------------|-------------|
| | Master's | PhD | Total | Master's | PhD | Total | Master's | PhD | Total |
| AMPD | \$2,191,851 | \$750,969 | \$2,942,820 | 193.6 | 130 | 323.6 | \$11,321.54 | \$5,776.68 | \$9,094.00 |
| Education | \$1,237,055 | \$363,417 | \$1,600,472 | 153.2 | 80.3 | 233.5 | \$8,074.77 | \$4,525.74 | \$6,854.27 |
| Environmental Studies | \$2,515,564 | \$356,371 | \$2,871,934 | 208.8 | 67.6 | 276.4 | \$12,047.72 | \$5,271.76 | \$10,390.50 |
| Glendon | \$761,007 | \$34,815 | \$795,822 | \$101 | 12.5 | 113.5 | \$7,534.72 | \$2,785.20 | \$7,011.65 |
| Health | \$1,558,319 | \$1,176,609 | \$2,734,928 | 245.9 | 256 | 501.9 | \$6,337.21 | \$4,596.13 | \$5,449.15 |
| LAPS | \$5,641,836 | \$3,644,350 | \$9,286,185 | 705.8 | 713.3 | 1419.1 | \$7,993.53 | \$5,109.14 | \$6,543.71 |
| Lassonde | \$862,022 | \$863,400 | \$1,725,422 | 118 | 119.1 | 237.1 | \$7,305.27 | \$7,249.37 | \$7,277.19 |
| Osgoode | \$391,362 | \$321,263 | \$712,625 | 252.2 | 52.8 | 305 | \$1,551.79 | \$6,084.53 | \$2,336.48 |
| Schulich School of Business | \$5,231,574 | \$1,427,793 | \$6,659,367 | 886.3 | 48.3 | 934.6 | \$5,902.71 | \$29,560.93 | \$7,125.37 |
| Science | \$943,320 | \$1,242,195 | \$2,185,515 | 165.7 | 203 | 368.7 | \$5,692.94 | \$6,119.19 | \$5,927.62 |
| Total (value) | \$21,333,910 | \$10,181,182 | \$31,515,090 | 3030.5 | 1682.9 | 4713.4 | \$7,039.73 | \$6,049.78 | \$6,686.28 |
| Total (%) | 68% | 32% | | 64% | 36% | | | | |

Chart 9: Internal Awards by Faculty (including York Graduate Fellowships)

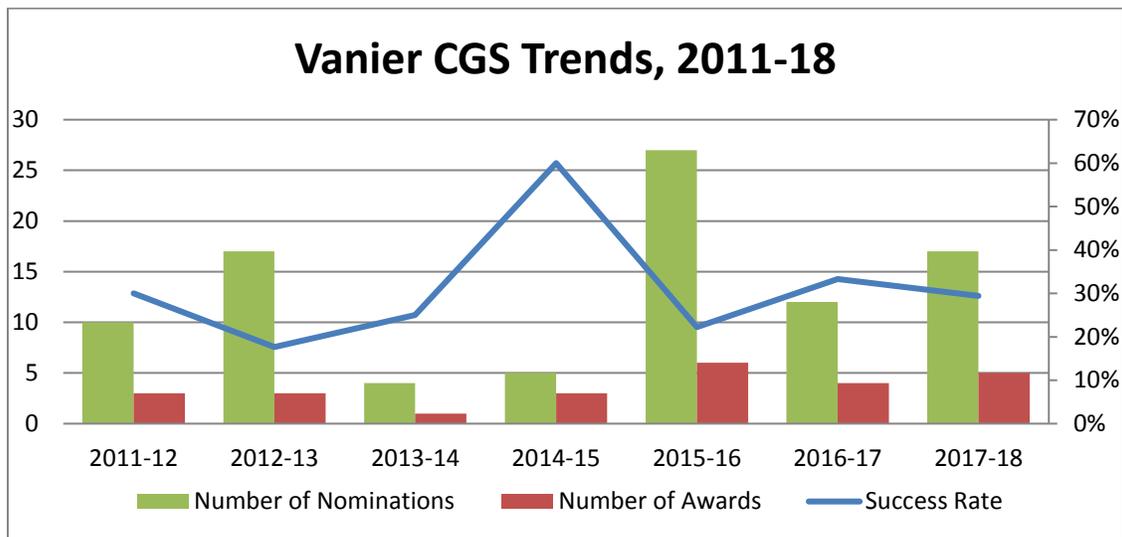
Other Major External Awards

The Faculty of Graduate Studies plays an active role in the nomination of outstanding students to Canada's most prestigious doctoral awards: the Vanier Canada Graduate Scholarship (\$50,000 for 3 years) and the Trudeau Foundation Scholarship (up to \$60,000 for 3 years). We continue to support the nomination processes for other major external awards, including the Banting post-doctoral fellowships, Polanyi Prize, Ontario Women's Health Scholars Awards, and Autism Scholars Awards.

Table 11: Vanier CGS nomination data, 2012-2019

| Vanier CGS | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| Year | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 |
| # of Applications | 26 | 12 | 8 | 160 | 93 | 95 | 93 |
| # of Nominations | 17 | 4 | 5 | 27 | 12 | 17 | 13 |
| Number of Awards | 3 | 1 | 3 | 6 | 4 | 5 | 5 |
| Success Rate | 18% | 25% | 60% | 22% | 33% | 29% | 38% |

Chart 10: Vanier CGS nomination data, 2012-2019



Scholarships for International Students

International students continue to be excluded from most internal and external awards due to the citizenship requirements of both federal/provincial funders. Many internal donor-based awards that were matched by the provincial government also require Ontario residency as an eligibility criterion, which also excludes international students. International students are encouraged to apply to the few that are available to them, including the Vanier and Trudeau scholarships, Elia Scholars Program, and the Graduate Fellowships for Academic Distinction. As of February 2019, the Ontario Trillium Scholarship program which is the major provincial award for international doctoral students is under review by the provincial government, and we have not been able to advertise the opportunity during the regular admissions cycle in the absence of confirmation to continue the program. The Faculty of Graduate Studies continues to work with the Office of Advancement to seek new award opportunities for international students.

Post-doctoral Fellows and Visitors

The Faculty of Graduate Studies is pleased to have responsibility for postdoctoral scholars at York University as part of our mandate as of January 2015.

FGS administers the Banting Postdoctoral Fellowship nomination process and supports the development, as appropriate, of CIHR, SSHRC and NSERC Postdoctoral Fellowships, among other postdoctoral opportunities. As is outlined in the University Academic Plan 2015-2020, the institution is committed to increasing the number of post-doctoral fellows and visitors on our campus and supporting their funding and research pursuits.

Table 12: Banting PDF data, 2015-2019

| Award Name | Banting PDF | | | |
|-------------------------------|-------------|---------|---------|---------|
| Award Year | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
| Number of Applicants | 21 | 34 | 23 | 28 |
| Number of Nominations | 9 | 10 | 8 | 9 |
| Number of Fellowships Awarded | 1 | 1 | 0 | 3 |

Table 13: Other Tri-council PDF data, 2016-2019

| Award Name | SSHRC PDF | | | NSERC PDF | | | CIHR PDF | | |
|--------------------------------|-----------|------|------|-----------|------|------|----------|------|------|
| Award Year | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 |
| Number of Fellowships Awarded* | 7 | 9 | 4 | 0 | 1 | 0 | 0 | 1 | 1 |

*Numbers are based on results available on funding agencies websites and include PDF awards that were subsequently declined.

Looking Forward: 2018 and Beyond

Awards Management Software Implementation: York University has acquired an awards management system which will facilitate the administration of awards. This new program, Fluid Review, is expected to improve the administrative efficiency, as most award applications are currently paper-based. We also expect that the program will increase the number of applications from students, as it will allow them to easily filter eligible awards and apply to them simultaneously. Since the spring of 2018, various units on campus, including the Registrar's Office, Student Financial Services, UIT and the Faculty of Graduate Studies have been actively meeting with the vendor in preparation for the implementation of the campus-wide solution. We expect to be able to start rolling out Fluid Review in the 2019 summer term.