

Final Report

Faculty of Medicine

Task Force on Innovation and Transformation in Graduate Education

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Co-Chairs

August 19, 2013

Final Report of the Task Force on Innovation and Transformation in Graduate Education

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Recommendations:

Recommendation 1:

Examine the role of the Faculty of Medicine as the Lead Faculty in individual graduate collaborative programs.

Recommendation 2:

- a) Develop new or additions to departmental graduate programs that include work experience placements for doctoral stream students.
- b) Co-ordinate recruitment beyond University of Toronto to attract highest quality graduate students from Canada and internationally. Support Hobson's Connect for Faculty of Medicine as part of this endeavor.
- c) Actively promote and identify new funding sources for mentored undergraduate research opportunities within the Faculty of Medicine with links to graduate education.
- d) Create/develop new scholarships to attract top graduate students (domestic and international) to Faculty of Medicine, University of Toronto.

Recommendation 3:

- a) The Faculty of Medicine (FoM) support graduate education as a purpose-driven network with societal relevance to be used as a mechanism to broaden the engagement of students and faculty with an emphasis on the graduate degree as the career hub that enables future professional choices.
- b) The FoM evaluate the SPARK program at Stanford U and the Graduate Student Internships for Career Exploration program at University of California at San Francisco and implement an appropriate variant at the UofT.

Recommendation 4:

- a) Develop sustainable programs for Faculty of Medicine graduate students to develop co-curricular, transferable professional skills during their graduate program.

- b) Implement and support a professional master's program in Translational Research in Health Sciences and create infrastructure that supports a translational medicine pathway within the Faculty of Medicine and its associated Divisions and institutions both local and international.

Recommendation 5:

The Vice Dean and Office of Graduate and Life Sciences Education take responsibility for managing UTQAP as it pertains to undergraduate Arts and Science and graduate education programs in the Faculty of Medicine, as appropriate.

Recommendation 6:

- a) Combined programs, both undergraduate (e.g. Arts and Science)-graduate and graduate-graduate, should be developed in the Faculty of Medicine.
- b) Combined programs between undergraduate medicine and graduate studies be established, including an MD-MPH and an MD-MSc Health Administration, as indicated in the Faculty of Medicine Strategic Plan.

Recommendation 7:

The Faculty of Medicine establish an implementation committee within the academic year 2013-14 to act on the recommendations of the Task Force in a timely fashion.

Principles of Graduate Education in Health and Biosciences

The Task Force committee articulated principles of graduate education in the Faculty of Medicine listed below. The principles are informed by goal 1 of the Faculty of Medicine Strategic Plan:

Prepare tomorrow's leading scientists and scholars, clinical professionals, and administrators who will contribute to fulfilling the goals of Medicine at U of T.

Principles:

1. Students will develop the ability to design and undertake relevant, innovative research.
2. Students will experience a research informed and evidence-based world class professional program
3. Students will have the opportunity to have experience with and an understanding of how to work with large complex data sets and deliver impactful analysis and implementation roadmaps.
4. GLSE should provide support to students during their transition to graduate studies and encourage mentorship and career development activities.
5. Students should develop resilience and self-motivation with the ability to demonstrate tolerance and accept and celebrate ambiguity.
6. FoM graduate education should enable outstanding, innovative disciplinary research focus while providing the opportunity to address inter-disciplinary relevant broad societal issues.
7. FoM graduate education should create a stimulating, intellectual environment for students and faculty that promotes timely degree completion.
8. FoM graduate education should facilitate integration across research-based and health professions programs
9. FoM graduate education should foster values associated with integrity in research.
10. Students should develop appropriate skill sets, such as:
 - a. Critical and creative thinking
 - b. Communication to peers and community
 - c. Problem solving
 - d. Co-curricular transferable skills
 - e. Leadership
 - f. Research management

1.0 Background

1.1 Expanded Portfolio of the Vice Dean Graduate to include oversight of Life Sciences Education in the Faculty of Medicine

The portfolio of Vice Dean, Graduate Affairs was expanded to become Vice Dean, Graduate and Life Sciences Education (GLSE) effective October 22, 2012. The portfolio of GLSE encompasses two major education activities in the Faculty of Medicine – Graduate Education and Undergraduate Education in the Life Sciences including Arts and Science and other interdivisional teaching. GLSE also oversees the activities of the Department of Teaching Labs (DTL). The portfolio was established to create an educational infrastructure to support new directions in interdisciplinary and interdivisional graduate education and research in the Faculty of Medicine.

The Vice Dean Research and International Relations portfolio encompasses facilitation of the Research Strategic Plan including innovation and training of new health research leadership. As part of this mandate the office is supporting new directions in interdisciplinary and interprofessional health research that are essential to support the new educational offerings for Graduate Education.

1.2 Task Force Commissioned

In January 2013 following the creation of GLSE, the Dean of the Faculty of Medicine Catharine Whiteside commissioned a Task Force to engage in thoughtful deliberations on the evolving nature of graduate education within and outside the University of Toronto. The objectives were to make recommendations on how the Faculty of Medicine doctoral and professional graduate programs could take advantage of existing innovative graduate initiatives elsewhere at the University and beyond, and develop new transformative programs aligned with the University's and Faculty's Strategic Plans especially the big ideas paradigm put forth in the Vice President, Research's, Strategic Plan and the focus on integration in the Faculty of Medicine plan. The Task Force would also explore how to maximize the benefits of graduate growth enrolment expansion focusing on recruitment and curriculum and programs.

1.3 Graduate Education

Graduate education within the Faculty of Medicine includes basic, clinical, community health and rehabilitation sciences. There are 14 Graduate Departments/units, 12 of which offer doctoral programs. The MSc and PhD programs provide an essential link between the two key mandates of the University: research and teaching. As of fall 2012, a total of 2099 doctoral stream graduate students were engaged in research with internationally recognized faculty on campus and in our 9 fully affiliated hospitals and research institutes. Their work captures the breadth and diversity of the biomedical and health fields today. The Faculty of Medicine is also heavily invested in graduate training of health professionals in 11 professional master's programs with over 948 students enrolled in the fall of 2012. In addition, our graduate units participate in many Collaborative Programs, which further enrich student academic experience and foster integration and interdisciplinary/interprofessional research.

1.4 Graduate Growth Enrollment Expansion

In its 2005 Budget, the Ontario government announced an expansion of graduate education, adding capacity for 14,000 more students by 2010. Expansion in Ontario has occurred in three distinct phases. The Faculty of Medicine has used this opportunity to increase enrolment in both its research and

professional graduate programs. Between 2004-2008, doctoral enrolment increased by 218 FTEs (18% increase), while the research stream master's increased by 65 FTE (7% increase) and the professional master's increase was 150 FTE (21% increase). In phase 2 (2009-2012) enrolment growth in the Faculty of Medicine slowed. From 2009 to 2012 doctoral FTE enrolment grew by 27 FTE (2%), doctoral stream master's by 53 FTE (6% increase) and professional master's by 99 (11% increase) or a 6% increase overall. In June 2012, under a new provincial graduate expansion, the provincial government allocated 600 of the 6,000 Phase 3 graduate spaces for 2012-13 with the remaining 5,400 spaces still to be allocated. The government has also extended the target for full expansion of the 6,000 spaces to 2017-18. The Faculty is committed to further expansion of its graduate programs and this Task Force will, in part, provide the focus for innovative and academically sound graduate initiatives for the next five years of the expansion program. Consideration of some graduate programs has already begun since students in MD/PhD program and the Clinician Investigator Program have been reviewed through the Task Force on Physician Scientist Education (report submitted June 2012). As task force deliberations were taking place, GLSE was already developing innovative initiatives to take advantage of current opportunities in the environment.

2.0 Task Force Findings

2.1 Term of Reference 1: Carry out an internal scan of University of Toronto graduate programs to identify innovation and transformation in Graduate Education with focus on curriculum development, interdisciplinary programs and translational research.

2.1.1 Collaborative Programs

Collaborative Programs (CP) are intra-university graduate programs that provide an additional multidisciplinary experience for students' enrolled in and completing the degree requirements for a degree program. Students from different degree programs complete a common learning experience, such as a core course and/or a seminar series, and complete a major paper, project, placement or thesis in the collaborative program area of research. Currently collaborative programs are based on a signed Memorandum of Agreement (MoA) between at least two participating graduate units. The Faculty of Medicine, Office of GLSE must sign the MoA and in doing so confirms that the Faculty of Medicine is the Lead Faculty for the specific CPs. CP resources, infrastructure and enrolment vary quite widely across the university. CPs undergo a cyclical review informed by the University of Toronto Quality Assurance Protocol and led by the School of Graduate Studies. The multidisciplinary focus of collaborative programs may make them an ideal platform to allow graduate students to engage in big questions across research fields.

Medicine is the lead Faculty for 16 collaborative programs:

- | | |
|---|---|
| 1. Aboriginal Health | 9. Global Health |
| 2. Addiction Studies | 10. Health Care, Technology and Place |
| 3. Aging, Palliative and Supportive Care Across The Life Course | 11. Health Services and Policy Research |
| 4. Bioethics | 12. Musculoskeletal Sciences (September 2013 start) |
| 5. Biomedical Toxicology | 13. Neuroscience |
| 6. Cardiovascular Sciences | 14. Public Health Policy |
| 7. Developmental Biology | 15. Resuscitation Sciences |
| 8. Genome Biology and Bioinformatics | 16. Women's Health |

2.1.2 Recommendation 1:

- *Examine the role of the Faculty of Medicine as the Lead Faculty in individual graduate collaborative programs.*

2.1.3 Placements within Education Programs

Hands-on experience in the professional and research realms is considered an important part of learning and is popular among students. One example of this is an undergraduate Arts and Science research stream program - University of Toronto Professional Experience Year Internship in Pharmacology, Toxicology and Pharmaceutical Chemistry. It is jointly offered by the Department of Pharmacology and Toxicology and the Leslie Dan Faculty of Pharmacy and is associated with the Professional Experience Year Office. It is a 12-16 month project-based, paid employment placement that takes place between the 3rd and 4th years of undergraduate study. There is no academic credit for this year of placement. It provides students an opportunity to apply the knowledge acquired in the first three years of university to private- or public-sector settings. Placements cover a wide range of opportunities, including pharmaceutical or biotechnology companies, university research labs, university-affiliated organizations or governmental research agencies. Students are accepted into the Internship program at the end of their 3rd undergraduate year. Students must have at least a 3.0 GPA and are drawn from the Specialist programs in Pharmacology, Toxicology and Pharmaceutical Chemistry. Prior to the placement students attend a series of training workshops put on by the department that enable the student to learn how best to present himself/herself to prospective employers. Students develop the knowledge, skills, and attitudes that foster successful life-long career management competencies.

There are internship opportunities through programs offered through government and non-governmental agencies. For example, the Institute of Biomaterial and Biomedical Engineering and the Faculty of Applied Science and Engineering have created work placements for graduate students using the following programs:

NSERC Industrial Postgraduate Scholarship Program: The NSERC IPS program allows doctoral students to gain research experience in industry while undertaking advanced studies in Canada in an NSERC eligible field. Currently IPS has a minimum value of \$21,000 per year (\$15,000 is provided by NSERC and \$6,000 is provided by the sponsoring company) and a duration of 24 or 36 months (depending on eligibility). There is no deadline for this award; students may apply at any time during the academic year.

MITACS's Accelerate internship program. MITAC is a national, not-for-profit research organization that connects companies with over 50 research-based universities through graduate students and postdoctoral fellows, who apply their specialized expertise to business research challenges. Interns transfer their skills from theory to real-world application, while the companies gain a competitive advantage by accessing high-quality research expertise

NSERC Collaborative Research and Training Experience (CREATE) programs. The CREATE Program is designed to improve the mentoring and training environment for the Canadian researchers by improving areas such as communication, collaboration and professional skills, as

well as providing experience relevant to both academic and non-academic research environments. Currently the Institute of Biomaterial and Biomedical Engineering (IBBME) houses 3 CREATE programs (industrial and Hospital internships). During each internship, students devote at least 20% of their training to the internship, have a defined project and defined skills that are acquired, such as project planning and management, estimation, budgeting, control of scope and communication.

2.1.4 Recruitment Scan for Innovation

The Graduate and Life Sciences Office (GLSE) launched several new and innovative activities targeting undergraduates in order to promote graduate recruitment:

In January 2013, GLSE organized the first annual Graduate Recruitment Fair in the Medical Sciences Student Commons. Representatives from the Graduate and Life Sciences Undergraduate programs provided information to University of Toronto undergraduate students. The Fair is being expanded to include the Arts and Sciences Human Biology program, University Health Network (UHN), Mount Sinai Lunenfeld-Tannenbaum Research Institute, and the Department of Cell and Systems Biology. This collaboration will foster interdisciplinary, interdivisional and Toronto Academic health Sciences Network (TAHSN) links.

The University has recently licensed Hobson's Connect, a customer relationship management software interface that facilitates communication between graduate applicants, departments, the School of Graduate Studies, and the University concerning information on applications, student life and resources, and academic programs. The software will allow the University to build, automate, execute and track admissions communications with prospective applicants from the initial inquiry all the way to enrolment. Hobson's Connect is currently used by several top-tier universities and colleges in North America. Under the leadership of SGS and GLSE, selected graduate units in Medicine are being trained on the product to provide support to units with resources and expertise. This database has the potential to transform graduate recruitment in the Faculty of Medicine by providing rapid exchange of information, direct contact with one or several departments and in-depth program information.

The Office of GLSE will participate in recruitment fairs outside Ontario in the fall of 2013 in order to recruit the highest quality out of province students to the Faculty of Medicine. This has been viewed as a serious gap in graduate recruitment to the Faculty of Medicine. The Office will join forces with the School of Graduate Studies in promoting its programs in support of all Faculty of Medicine graduate programs.

The Task Force recognizes that support staff, especially Graduate Administrators, are critical to the success of graduate programs as they are often applicants' and students' first line of contact. In 2013, the Vice Dean GLSE reached out directly to all the graduate administrators to broaden GLSE communication with the people who are responsible for the daily operation of graduate programs, as well as to share ideas, strategies and best practices on issues of mutual concern, including recruitment. The first meeting with the Graduate Administrators occurred in January 2013 with the second in May 2013, and going forward, regularly scheduled meetings are planned for every four months.

The Office of GLSE has been sending comparative ROSI download data to unit chairs, graduate

coordinators, business officers and graduate administrators. This data provides units with comparisons with the previous year to assess how recruitment is evolving for the year in real time.

In 2012, Life Sciences Planning Curriculum Committee (Faculties of Arts and Science and Medicine) prepared the brochure “How to Find an Undergraduate Research Opportunity in Life Sciences”. This brochure serves to disseminate information on how undergraduates access and apply for research opportunities and to enhance the fundamental connection between teaching and research. Another brochure was created by Graduate and Life Sciences Education entitled “How to Find a Graduate Program and Supervisor”. These target potential graduate students and have been popular with undergraduates. To support these initiatives the Office of GLSE, based on a need identified in student surveys, has developed a web-based electronic catalogue of available mentored research opportunities on the St. George campus and in the affiliated hospitals and research institutes.

The Task Force recognizes that the recruitment and enrolment of international students remains a source of challenging discussion at the University of Toronto. The province of Ontario, unlike the other provinces, provides grant funds to university for domestic students only, not international. Graduate research stream international tuition at the University of Toronto is more than double a domestic student (\$17,730 versus \$7160 in 2013-14) which is a financial burden for supervisors and departments who must provide stipends that include the high international tuition for graduate students. In the Faculty of Medicine international student enrolment has remained low. In November 2012 international students made up 8.4% of the PhDs 10.2% of the research stream master’s and 2% of the professional master’s students.

2.1.5 Recommendation 2:

- a) *Develop new or additions to departmental graduate programs that include work experience placements for doctoral stream students.*
- b) *Co-ordinate recruitment beyond University of Toronto to attract highest quality graduate students from Canada and internationally. Support Hobson’s Connect for Faculty of Medicine as part of this endeavor.*
- c) *Actively promote and identify new funding sources for mentored undergraduate research opportunities within the Faculty of Medicine with links to graduate education.*
- d) *Create/develop new scholarships to attract top graduate students (domestic and international) to Faculty of Medicine, University of Toronto.*

2.2 Term of Reference 2: Carry out an external scan of appropriate graduate programs outside of University of Toronto to identify innovation and transformation in Graduate Education with a focus on curriculum development and management, interdisciplinary and interfaculty programs and translational research.

2.2.1 External Leading Edge Programs

A significant challenge for most Universities is the changing landscape with respect to graduate student

employment post-degree. In the majority cases student are no longer following the path to an academic professorial career, choosing opportunities in multiple different commercial and not-for-profit venues. In spite of this marked trend, the majority of courses and training offered to our graduate students remains focused on a single pathway, that of academe.

When Dr. Keith Yamamoto from the University of California at San Francisco met with members of the taskforce in April 2013 to discuss the needs for the biosciences workforce and academic health researchers of the future, he re-enforced the concept of the PhD degree being a hub from which multiple careers can be accessed. The concept of the PhD as a career hub resonates with graduate students and faculty and reinforces the need to re-think and re-tool the graduate education experience. Leading edge programs to examine are the SPARK Translational Research Program at Stanford (<http://sparkmed.stanford.edu/>), the Eureka Institute (<http://www.eurekainstitute.org/>, UofT is a sponsoring university of Eureka), and the Graduate Student Internships for Career Exploration program at University of California at San Francisco <http://gsice.ucsf.edu/>.

In the immediate future there will be a significant challenge providing a workforce that understands, can access and manipulate large complex health research databases (this includes, traditional bioinformatics, population data and meta-analysis of integrated data from multiple sources. In an optimal situation all graduate students would have an exposure to large data and an understanding of the complexities associated with turning data into useful, relevant knowledge.

2.2.2 Micro Salon: Re-Discovering Learning: Graduate Education 2022

In December 2012, senior Faculty of Medicine leaders initiated and participated in the IDEAS Salon: Rediscovering Learning 2022. The Salon included business and thought leaders outside of the Faculty of Medicine and the purpose was to engage in visionary inquiry and discussion. Outcomes included concepts like the provocative re-framing of the future of Research and Development as Curiosity, Purpose, and Dispersal.

From May 3-5, 2013 a smaller Micro Salon focused on how to engage and apply these insights as guiding principles for the imagining of a new outline for academic graduate programs. This session brought together leadership from the University of Toronto, The Epic Decade, and select collaborating partners.

Micro Salon Participants:

Don Aldridge, IBM

Quinn Bingham, Advancement, Medicine

Alison Buchan, Vice Dean, Research and International Relations, Medicine

Avrum Gotlieb, Vice Dean, Graduate and Life Sciences Education

Gautam Gulati, Physician Interactive Holdings

Howard Hu, Dean, Dalla Lana School of Public Health

Alex Jadad, CRC Health Innovations, Medicine

Allan Kaplan, Director Institute of Medical Science

Anita McGahan, Associate Dean Research, Rotman School of Management

Paula Rochon, Vice President Research, Women's College Hospital

Ruth Ross, Chair, chair, Pharmacology and Toxicology, Medicine

Don Simpson, Innovation Expedition

Chris Yip, Director Institute for Biomaterials and Biomedical Engineering

Seth Goldenberg, Kate Thiel, Venessa Miemis, Emily Norton, Intellectual Property for the 21st Century

The outcomes of the Graduate Education Micro-Salon can be summarized by the phrase: **graduate education as a purpose driven network with societal relevance.**

The participants focused on how to create an environment for students that would enable them to engage in “big problem thinking and solutions for significant societal challenges” while remaining in their current programs. The concept focuses around the “Epic Question” and requires the Faculty of Medicine/participants to engage in discussions of what the appropriate questions would be. Suggestions are “Health through the Life Course”, and “Mental Health and Addictions”.

Once the overarching Epic Questions are agreed on, the implementation strategy will involve 2 or more faculty leaders as champions who will engage Pioneer Teams to create communities of learning around the topic. At this time Drs Jadad and Rochon have self-identified as champions for the Health through the Life Course, and Drs Ross and Kaplan have self-identified as champions for the Mental Health and Addictions, Epic Questions.

2.2.3 Entrepreneurship Training

The Faculty of Applied Science and Engineering has a long history of promoting and supporting entrepreneurship in graduate programs with many students having one or more start-up companies, as well as the opportunity to spend 3 – 6 months in a work placement outside their Department. The Faculty of Medicine does not currently offer specific courses or opportunities to students, however there is strong interest from the students in participating in similar opportunities.

2.2.4 Recommendation 3:

- a) *The FoM support graduate education as a purpose-driven network with societal relevance as a mechanism to broaden the engagement of students and faculty with an emphasis on the graduate degree as the career hub that enables future professional choices.*
- b) *The FoM evaluate the SPARK program at Stanford U and the Graduate Student Internships for Career Exploration program at University of California at San Francisco and implement an appropriate variant at the UofT.*

2.3 Terms of Reference 3: Based on these scans and the strategic plans of the Faculty and the Departments in the Faculty of Medicine recommend new approaches to developing curricula in graduate education that especially reflect both the identified needs of students as part of their career training and the best practices in graduate supervision.

2.3.1 New Program Development

The Ontario provincial government’s expansion of graduate enrolment plan has led to expansion of existing programs, but also an opportunity to consider new program development within the Faculty. New programs should focus on the emerging areas of biomedical sciences and health care which will lead to major advances in these areas. Interdisciplinary training and activities need to be fostered by an innovative curriculum. Computational biology and links to computer sciences are essentials.

One major initiative developed over the 2012-13 academic year is the new professional master's program in Translational Research in Health Sciences which is scheduled for governance during the 2013-14 academic year. The Institute of Medical Science has developed this unique program and has engaged in close collaboration with the Knowledge Media and Design program of the iSchool in order to deliver the program. The program will train students in the competencies required to create innovation in the Health Sciences, and bring discoveries out of the laboratory to the applied clinical setting. The program features a modular curriculum that will allow students to fashion elements of their own program. The program is highly collaborative and encourages students to make creative connections and problem solve outside their own research field, and has a focus on mentoring. One distinctive curricular feature is the capstone project, which will be a culmination of breadth of knowledge, design and communication skills and experiential learning.

2.3.2 Career Development for Graduate Students

The career path of a typical doctoral student has changed over time. Previously the majority of PhD students were expected to pursue an academic career and perhaps hold a postdoctoral fellowship on the way to the academic career. Now the majority of PhDs work outside academe. It makes sense that graduate programs should reflect this change and offer training in skills that promote employment success among our graduates, such as communication skills, technological skills, ethics in research, career planning, effective time management, working effectively in teams, and leadership skills.

Graduate students are interested in exploring numerous career opportunities, many of which are outside of academia. The Office of GLSE has been supporting several student initiatives including the Life Sciences Career Development Society and the Biochemistry/Immunology sponsored event "Biomedical Career Development Workshop". However, development of a career development curriculum for FoM graduate students would be most welcomed by students and provide an important supplement to the education of our graduates.

Currently the Faculty has a number of events and groups that promote career development among graduate students, many of which are initiatives of graduate students themselves. While these activities are often of a very high quality, they are scattered unevenly throughout the disciplines, rely on volunteers, and have limited resources.

The School of Graduate Studies' Graduate Professional Skills Program (GPS) helps fill a need, although it needs to be better advertised among students. It provides graduate students with a variety of co-curricular offerings in the areas of communications and interpersonal skills, teaching competence, personal effectiveness and research-related skills. It is optional, but is open to any graduate student. The completion of 20 credits is noted on the student's official transcript as a co-curricular activity. SGS partners with on-campus organizations and they provide the content. Partners include: Academic Support Centre, Career Centre, Counseling and Psychological Services, English Language and Writing Support, Family Care Office, Leadership Development Programs, Office of Student Life, Office of Research Ethics, MITACS, Let's Talk Science, Graduate Management Consulting Association.

2.3.3 Recommendations 4:

- a) *Develop sustainable programs for Faculty of Medicine graduate students to develop co-curricular, transferable professional skills during their graduate program.*

- b) *Implement and support a professional master's program in Translational Research in Health Sciences and create infrastructure that supports a translational medicine pathway within the Faculty of Medicine and its associated Divisions and institutions both local and international.*

2.4 Terms of Reference 4: Recommend approaches to utilize UTQAP to assist Graduate Departments in developing best practices for curriculum oversight, management and overall academic performance.

The University of Toronto Quality Assessment Process (UTQAP) outlines the protocols for the assessment and approval of new programs, review of existing programs, modification to existing program and closures of programs. In the Faculty of Medicine the oversight for unit reviews rests with the Academic Affairs Office. The Office of Graduate and Life Sciences Education is responsible for communications on data related to graduate and undergraduate programs in the Life Sciences. GLSE also supplements with extra-university (ie hospital-based) data, packages provided by the Provost's Office in order that statistics related to student funding are not under represented. Data for reviews will be aligned to reflect suitable key performance indicators.

In March 2013, the Office of GLSE conducted a survey on course evaluation of all graduate units. The survey revealed that all graduate units do conduct evaluations of their courses, units use a mix of paper based and online evaluation methods, and no unit releases the results to their students. In April 2012, the University of Toronto approved a policy on course evaluation with the guiding principles of regular course evaluation and sharing evaluation results with the community. During the 2012-13 academic year, the Graduate Curriculum Committee discussed the wide-ranging practices in Medicine and reviewed the new University of Toronto online course evaluation tool. This review has led to the Institute of Medical Science using the tool in a few courses as a pilot project during 2013-14. A working group is meeting to plan the implementation of this pilot project this summer. The intent is to expand the pilot to all graduate courses and to show how evaluations can be used in the improvement of graduate education.

2.4.1 Recommendation 5

- *The Vice Dean and Office of Graduate and Life Sciences Education take responsibility for managing UTQAP as it pertains to undergraduate Arts and Science and graduate education programs in the Faculty of Medicine, as appropriate.*

2.5 Terms of Reference 5: Recommend processes for effectively linking undergraduate (Arts and Science) and graduate curricula, with particularly emphasis on the development of 3 plus 2 BSc/MSc degree programs in the biomedical sciences.

The innovation of linking graduate students and undergraduate students provides new transformative opportunities in education. Linking education and research does result in a greater breadth and depth in course offerings and in experiential research opportunities. Undergraduate students are more easily exposed to the innovation agenda of graduate education. Impact is felt locally by having the best research faculty available to teach and mentor undergraduates. The graduate students have greater interaction with undergraduate students which will facilitate mentoring of undergraduates by graduate students. Impact will also be felt nationally and internationally as online learning is being developed by departments that engage in advanced research.

The Office of GLSE facilitates programs that are of value to both graduate and undergraduate students, such as student integrity in education and research. This portfolio allows for easier linking of advanced senior undergraduate learning with graduate education. This provides the much needed depth of scholarship to prepare students for many careers and for advanced education.

2.5.1 Combined Programs

Combining two existing graduate programs opens a strategic, streamlined path for students to acquire expertise in two separate disciplines. Historically there have been a number of models at the University of Toronto, where graduate programs or a second level undergraduate program have been combined with a graduate program. The Faculty of Medicine has three such combined programs: Health Administration and Social Work, Health Administration and Nursing, and the MD/PHD program. The MD/PhD Program consists essentially of two parallel tracks – undergraduate medicine and graduate. The Task Force on Physician Scientist Education, the recommendations of which were accepted by Faculty Council in October 2012, recommended the development of an integrated physician scientist pathway, a separate educational track consisting of an enhanced curriculum that spans fundamental disciplines to the full breadth of translational medicine. Development of such a curriculum will necessitate considerable changes to the presentation of the curriculum in the undergraduate medical and graduate-level curricula. As well, the Strategic Plan of the Faculty of Medicine indicates that a combined MD-MPH and MD-MSc Health Administration will be launched.

Recently the University has broadened the framework of traditional combined programs to allow first entry level undergraduate degrees to pair with graduate degrees. This is sometimes called the 3+2 model. The advantages of this model are:

- Supports a flourishing academic focus
- Meet growing occupational need
- Deepens the educational experience of students
- Enhances attractiveness of both programs and strengthens avenues of recruitment
- Provides an articulated path for excellent undergraduates
- Provides a novel stream of students into a graduate program
- Shortens students' time to completion
- Can reduce academic overlay between programs

The first combined program of this kind at the University is the UTSC BSc in Environmental Science and the FASE Master of Engineering (commencing September 2013). After interviewing the stakeholders involved in developing this combined program, the following points were identified as potential issues to be addressed when planning a combined program:

- Does the combination under consideration make academic sense
- Who are the students
- Is there a clear articulated pathway through undergraduate and graduate programs
- Is there capacity in both programs
- Need to work through the financial implication (BIU and tuition) in consultation with Planning and Budget to determine financial issues.

The Department of Pharmacology and Toxicology is currently exploring introducing a coursework option

to its research master's program and also pairing this option with the BSc as a combined program.

2.5.2 Recommendation 6:

- a) *Combined programs, both undergraduate (e.g. Arts and Science)-graduate, and graduate-graduate, should be developed in the Faculty of Medicine.*
- b) *Combined programs between undergraduate medicine and graduate studies be established, including an MD-MPH and an MD-MSc Health Administration, as indicated in the Faculty of Medicine Strategic Plan.*

2.6 Recommendation 7:

The Faculty of Medicine establish an implementation committee in the academic year 2013-14 to act on the recommendations of the Task Force in a timely fashion.

Appendix A

Terms of Reference

The following Terms of Reference were approved by the Faculty of Medicine:

- 1) Carry out an internal scan of University of Toronto graduate programs to identify innovation and transformation in Graduate Education with focus on curriculum development, interdisciplinary programs and translational research.
- 2) Carry out an external scan of appropriate graduate programs outside of University of Toronto to identify innovation and transformation in Graduate Education with focus on curriculum development and management, interdisciplinary and interfaculty programs and translational research.
- 3) Based on these scans and the strategic plans of the Faculty and the Departments in the Faculty of Medicine recommend new approaches to developing curricula in graduate education that especially reflect both the identified needs of students as part of their career training and the best practices in graduate supervision.
- 4) Recommend approaches to utilize UTQAP to assist Graduate Departments in developing best practices for curriculum oversight, management and overall academic performance.
- 5) Recommend processes for effectively linking undergraduate (arts and science) and graduate curricula, with particularly emphasis on the development of 3 plus 2 BSc/MSc degree programs in the biomedical sciences.

Appendix B Methodology Used by the Task Force

An internal and external environmental scan on recent graduate program initiatives was carried out by the Faculty of Medicine Offices of Research and Graduate and Life Sciences Education (see Appendix A for a list of material). Pertinent reports and presentations were provided to Task Force members, and made available for the Task Force members on the UT Portal. During the Task Force meetings members and internal and external educational experts presented on the following topics:

- Discussion of NIH Work Force report in Life Sciences
- The new Expanded Scope for Combined Programs at UT, Jennifer Francisco, GLSE, March 22, 2013
- Presentation of Dr. Keith Yamamoto: “Research and training in an era of New Biology and Precision Medicine,” April 23, 2013
- Summary of Dr. Yamamoto’s talk and its relevance to the UT environment, Steffen-Sebastian Bolz, April 30, 2013
- Faculty of Medicine members and external participants participated in an Ideas Micro Salon from May 3-5 at Massey College and the Rotman School of Management. The Salon was a follow up on the December 2012 IDEAS Salon in California: Rediscovering Learning 2022 Salon and focused specifically on graduate education. Alison Buchan reported on this to the task force.
- Career development for Life Sciences Graduate Students, Songyi Xu (graduate student) May 27, 2013
- Work Placements for Graduate Students in IBBME and Engineering, Christopher Yip, IBBME May 27, 2013
- GPS: A Roadmap for Graduate Professional Skills Development, Karen McCrank, Programming Coordinator, School of Graduate Studies May 27, 2013
- At the same time as the Task Force was deliberating, two other complementary activities Chaired by Alison Buchan were occurring: Faculty of Medicine Design Thinking Working Group and the Biomedical Sciences Research Renewal Task Force. Both will have some impact on graduate education in the Faculty of Medicine and provide infrastructure and an environment to foster state of the art interdisciplinary training and research.

Appendix C Internal Scan Material

Life Sciences Career Development Society (LSCDS) Career Day (on Portal)

Jennifer Francisco, “New Expanded Scopes of Combined Programs”, presentation to Task Force on March 22, 2013.

Karen McCrank, “GPS: A Roadmap for Graduate Professional Skills Development at the University of Toronto” presented to the Task Force on May 27, 2013

Songyi Xu, “Career Development for Life Sciences Graduate Students” presented to the Task Force on May 27, 2013

Christopher Yip, “Work Placements for Graduate Students in IBBME and Engineering” presented to the Task Force on May 27, 2013.

External Documents

Dr. Keith Yamamoto “Research and Training in an Era of New Biology and Precision Medicine” Presentation to the Task Force, 23 April, 2013

Marcus Clark, MD, Chicago Pritzker School of Medicine, “Interdisciplinary Scientist Training Program” Slide Deck Presentation

Wishwa N. Kapoor, MD, MPH, “Competency Based Education in Clinical and Translational Science” Clinical and Translational Science Institute, University of Pittsburgh

Wayne T. McCormack, PhD, University of Florida College of Medicine, “Train to Do Team Science: Team-Based Learning”

Sally J. Rockey, PhD “Biomedical Research Workforce Working Group: A Working Committee to the NIH Director”, September 2012

Gyongyi Szabo, MD, PhD, “Clinical and Translational Science Training at U of Massachusetts Medical School” GREAT Group Presentation September 21, 2012