UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

MEETING OF FACULTY COUNCIL
OF THE FACULTY OF MEDICINE

A meeting of Faculty Council will be held on **Monday, April 22, 2019**, from 4:00 p.m. to 6:00 p.m. in the **Red Room, Donnelly Centre**, University of Toronto.

AGENDA

1	**Call to Order**		Speaker
2	**Minutes of the previous meeting of Faculty Council – February 11, 2019**		Speaker
	2.1	Business Arising	
3	**Report from the Speaker**		Speaker
4	**Reports from the Dean's Office**		
	4.1	Report from the Dean's Office	T. Young
	4.2	Vice Dean, Research and Innovation	R. Hegele
	4.3	Vice-Dean, Partnerships	L. Wilson
	4.3	Vice-Deans, Education	P. Houston S. Spadafora A. Kaplan
5	**Items for Approval**		
	5.1	**The Research and Education Committees of Faculty Council recommend the approval of the following motions:**	
		"THAT the proposal establish a new Master of Health Science in Laboratory Medicine be approved as submitted."	R. Kandel
	5.2	**The Education Committee of Faculty Council recommends the approval of the following motions:**	
		"THAT the proposed Major Modification to the MSc and PhD Program in Molecular Genetics be approved as submitted."	P. Roy
		"THAT the proposal to close the Master of Health Science in Medical Radiation Sciences be approved as submitted."	N. Harnett
		"THAT the revised curriculum for the MSc in Occupational Therapy be approved as submitted."	D. Dawson
6	**Standing Committee Annual Reports**		
	Postgraduate Medical Education Board of Examiners		J. Pirie
	Education Committee		B. Mori
	Research Committee		M. Ostrowski

7	**Faculty Council Forum**	I. Witterick
	Faculty of Medicine Space Planning	H. Taylor
8	**Adjournment**	Speaker

NEXT MEETING: TBD, Fall 2019

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

FACULTY COUNCIL
FACULTY OF MEDICINE

Meeting Materials – April 22, 2019

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UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

Faculty Council of the Faculty of Medicine
Minutes of the February 11, 2019 meeting
4:00 p.m.
Red Room, Donnelly Centre

Members Present: B. Steipe (Speaker), T. Coomber, T. Young, I. Witterick, R. Hegele, A. Levinson, L. Wilson, T. Kislinger, M. Farkouh, S. Spadafora, V. Rambihar, T. Pignatiello, V. Waters, S. Myrehaug, S. Schneeweiss, M. Akens, A. Kaplan, R. Kandel, J. Rutka, B. Mulsant, G. Collingridge, D. Templeton, S. Rauth, B. Mori, R. Collins, R. Forman, D. Tweed, R. Kirsch, J.Davis, A. Mihailidis, M. Bhatia, J. Dupre, R. Ponda

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1 Call to Order

2 Minutes of the previous meeting of Faculty Council – October 15, 2018

The minutes of the meeting of October 15, 2018 had been previously circulated. They were approved on a motion from A. Kaplan and seconded by B. Mori. There was no business arising.

3 Report from the Speaker

The Speaker indicated that, as per the Faculty Council By-Laws, the Executive Committee received and reviewed External Reviews for the Physician Assistant Program in the Department of Family and Community Medicine.

4 Reports from the Dean's Office

4.1 Dean's Report

Dean Young noted the recent announcement of the Department of Psychiatry's new network dedicated to understanding the biology of depression and praised the robustness of the philanthropic community.

Chancellor emeritus, Michael Wilson, passed away yesterday and the Dean remembered him as a champion in a number of areas within the University. Dean Young specifically noted Mr. Wilson's devotion to causes in the area of mental health. There will be more opportunity's to recognize Mr. Wilson in the coming days.

4.2 Vice Dean, Research & Innovation

Dr. Richard Hegele indicated the September 2018 CIHR project grant competition. The overall success rate on campus and with the affiliated hospitals was 17.6% compared to the overall success rate of 16.2%. The average grant amount was just under $600 000 with the most grants being 5 years.

The special call for Canada Research Chairs targeting the four federally designated groups (women, people with disabilities, underrepresented minorities, and indigenous) was managed centrally by the Vice President, Research and Innovation's Office. 338 applications were received across campus and the affiliated hospitals. 16 candidates were put forward for the April 2019 competition with 7 coming from the Faculty of Medicine.

The New Frontiers research fund is meant to encourage high risk-high return research. The first of three funds is the Exploration Fund. This competition will catch items that can often fall in the cracks between other funding options. Other New Frontiers funds will focus on international initiatives and large scale transformative initiatives, respectively and will be rolling out over time. The Vice Dean will update the Faculty Council as they are announced.

The Canada Foundation for Innovation Fund representatives came to Toronto on January 31 as part of a cross Canada consultation. The call for proposals will no longer be announced at unknown intervals and will now be set at standard intervals with the next call anticipated in approximately March. It is currently unknown how much funding will be directed to U of T.

4.3 Vice-Dean, Partnerships

Dr. Lynn Wilson indicated that she and Dr. Julie Maggi are co-chairing a Faculty wellness working group that will be making recommendations to the Dean regarding the establishment of a Faculty wellness program. Four action teams have been established will be doing a literature review and examining best practices.

Dr. Wilson noted that an updated standards for relationships with industry will be presented for approval later in the meeting. The professional relationship working group has been working on an educational module with the goal of having this module be part of the reapplication for hospital privileges beginning in 2020.

In international relations, the relationships Canada has with Saudi Arabia and China has been in the news lately. The Faculty is keeping an eye on the developing situations with these countries. These are two important partners but the Faculty is working on diversification. The Faculty believes that globalization and internationalization are important for our learning environment so recruitment of international students remains important.

Dr. Wilson noted that, with the primary leadership from Dr. Najma Ahmed, Canadian Doctors for Protection from Guns has been launched. Dr. Ahmed will be speaking to the Senate next week and a National Day of Action is being planned for April.

4.4 Vice-Deans, Education

Dr. Allan Kaplan noted that that the governments new policy of tuition was developed without consultation of any kind but will have significant impact. There is to be a 10% cut in tuition across all disciplines. This translates to a 3% budget cut for the University. Tuition will be frozen after that. This represents a shortfall of $65 million. In addition, most OSAP grants are being moved to loans leaving students with more debt upon graduation. Finally, approximately $1500 of mandatory fees now must be divided into mandatory and discretionary categories. The goal is to put money into student pockets but will have a major impact on campus life.

Dr. Sal Spadafora noted the CaRMS match is coming in a couple of weeks and both he and Dr. Patricia Houston are working diligently to prepare to support learners who don't match. Dr. Spadafora noted that a full written report will be submitted for the April meeting.

5 Items for Approval

"THAT the Relationships with Industry and the Educational Environment in Undergraduate and Postgraduate Medical Education document be approved as submitted."

Moved: B. Mori, Seconded: A. Kaplan

Dr. Sherif El-Defrawy reminded members that, in February 2013, Faculty Council approved the standards for relationships with industry in the educational environment. In the intervening years, the disclosure form has

been used variably across clinical departments. In 2016-2017, the Faculty undertook collection of disclosures by full-time clinical faculty in all twelve clinical departments. On December 15, 2017 TAHSN members agreed to align their respective professional relationships management processes. To this end, TAHSN approved common principles for relationship management policies, a TAHSN-wide relationship management committee, procuring a TAHSN-wide electronic system for relationship disclosure and management (CMaRS), and working collaboratively with the University, particularly with respect to full-time clinical faculty disclosures.

During the 2017-2018 academic year, the Faculty employed the disclosure form found in Appendix A to obtain disclosures from full-time clinical faculty who had not completed the CMaRS administered relationship disclosure process. In January 2018, the Professional Relationships Management Committee (PRMC) of the Faculty was established. The PRMC's recommendation is that detailed disclosure responses, particularly those pertaining to Hospital Business, not be accessible to the Faculty.

The PRMC is requesting the approval of the Standards as outlined in the submitted document "Relationships with Industry in the Educational Environment" so that the Faculty's Standards align with the Common TAHSN Professional Relationships Disclosure Process. For ease of reviewing, a second document is attached in which the original text of the Standards are compared with the proposed changes.

The motion passed.

"THAT the Faculty Of Medicine Guidelines for the Assessment of Teaching Effectiveness in Tenure Decisions for Tenure-Stream Faculty and Assessment of Teaching Effectiveness in Continuing Status Decisions and Promotion for Teaching Stream Faculty be approved as submitted."

Moved: B. Mori, Seconded: I. Witterick

Dr. Allan Kaplan indicated that, given the critical importance of teaching, the evaluation of teaching effectiveness is a fundamental component of the career of the majority of faculty and occurs regularly during annual performance reviews as well as at career landmarks such as tenure, continuing status and promotion. These Guidelines for the Assessment of Teaching Effectiveness in Tenure for Tenure-Stream Faculty and Assessment of Teaching Effectiveness in Continuing Status Decisions and Promotion for Teaching Stream Faculty reflect the University's and Faculty's commitment to encouraging and supporting the highest standards of teaching, and to evaluating the teaching effectiveness of faculty in a rigorous and multidimensional manner.

Teaching involves a broad range of activities including lectures, seminars and/or tutorials, individual and group discussions, laboratory teaching, practice-based teaching (e.g. clinical), online teaching, as well as experiential and research supervision (undergraduate, graduate and clinical) and any other means by which students derive educational benefit. The role of faculty as teachers may also include a variety of teaching-related activities such as pedagogical scholarship; leadership in teaching or curriculum initiatives; developing course content (including the creation of courseware, multi-media applications and assignments); academic oversight of practicum placements; coordinating the placement of students taking research project courses; administration of one or more large courses, or the coordination of courses or programs of a department; hiring Teaching Assistants; and other directly related administrative duties.

These Guidelines apply specifically to tenure stream faculty coming forward for tenure review, and to teaching stream faculty coming forward for continuing status review and promotion. They are intended to provide guidance on the implementation of the University of Toronto policies and procedures.

The motion passed.

"THAT the MD Program Education Goals be amended as submitted."

Moved: B. Mori, Seconded: R. Kandel

Dr. Tony Pignatiello indicated that the purpose of the MD Program Education Goals is to provide a high-level articulation of the physicians of the future that the program aspires to graduate, which in turn informs curricular

content, delivery and approaches to student assessment and progression. With that purpose in mind, the MD Program engaged in broad stakeholder consultation (including faculty, students and staff) over the 2017-18 academic year in order to refresh our education goals. Following those consultations, the proposed goals were presented to and endorsed by the Dean's Executive Committee and MD Program Curriculum Committee, and formally approved by the MD Program Executive Committee on June 12, 2108.

The motion passed.

6 Standing Committee Annual Reports

6.1 Appeals Committee

Dr. Doug Templeton noted that recently he has reported that the appeal rate has dropped off and he has noted one or no appeals were heard in most recent years. He indicated there was an uptick in appeals when the MRS program came online and again when the PA program came online. Dr. Templeton noted there is more activity to report this year with no specific explanation as to the increase in cases.

All appeals this year came from either the MD program or from PGME residents. There have been three appeals heard all being related to the assignment of remediation by the Board of Examiners. All of these appeals were denied by the Appeals Committee and one appellant has chosen to appeal this decision to the Academic Appeals Committee of Governing Council. In addition to the cases heard, there are three other cases is various stages of the appeals process.

6.2 UME Board of Examiners

Dr. Blake Papsin noted that the UME Board of Examiners is a fascinating committee. Most often, the Board is assigning remediation for failed exams and notes that there has not yet been a successful appeal during his time on the Board. Dr. Papsin doesn't believe that this is the primary measure of success but notes that it means the decisions that are being made are defensible. He also notes that the Board has reconsidered a number of decisions on the basis of new information that may have otherwise gone to appeal. The 2017-2018 BOE statistics are available on page 5 of these minutes.

7 Faculty Council Forum

Dr. Brian Hodges presented the Faculty Council Forum on artificial intelligence and the implications for health professionals of the future.

8 Adjournment

The meeting was adjourned at 5:55pm

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

FOR APPROVAL

TO:	Faculty Council
SPONSOR:	Allan Kaplan, Vice-Dean, Graduate and Academic Affairs
CONTACT INFO:	Rachel Zulla, Graduate Affairs Officer; 416-946-0412; rachel.zulla@utoronto.ca
DATE:	April 22, 2019
AGENDA ITEM:	**5.1**
ITEM OF BUSINESS:	New Program – Master of Health Science (MHSc) in Laboratory Medicine

JURISDICTIONAL INFORMATION:

The University of Toronto Quality Assurance Process dictates that a new degree program requires the approval of divisional and university governance. The By-laws of the Faculty of Medicine Faculty Council dictate that a proposal for a new degree program be approved by the Education Committee and Faculty Council. It is at the discretion of the FOM Executive Committee to determine if the proposal will be reviewed by the Research Committee.

GOVERNANCE PATH:

1. Education Committee [For recommendation] – February 28, 2019
2. Research Committee [For recommendation] – March 18, 2019
3. Faculty Council [For approval] – April 22, 2019

CONSULTATIVE PATH:

The proposal has been seen and approved by the following committees at the Faculty of Medicine

- GLSE Graduate Curriculum Committee, February 13, 2019

HIGHLIGHTS:

The Department of Laboratory Medicine and Pathobiology (LMP), with close collaboration with the Department of Obstetrics and Gynecology (OB/GYN), is proposing the creation of a two year full-time professional Master's graduate program (Master of Health Science degree) to educate clinical laboratory medicine scientists in one of two fields: Pathologists' Assistant (PA) or Clinical Embryology (CE). The academic rationale for the program is to provide education that imparts general core knowledge in laboratory medicine and specific basic and applied principles and skills of anatomic pathology or assisted reproductive technology (ART) required to work as high quality laboratory scientists. The nature of this

graduate program equips trainees to apply their knowledge to complex decision making, to serious ethical issues and to develop a strong sense of personal accountability and intellectual rigor and independence.

PROPOSED MOTION:

> *"THAT the proposal establish a new Master of Health Science in Laboratory Medicine be approved as submitted."*

UNIVERSITY OF TORONTO

University of Toronto
New Graduate Program Proposal

This template (last updated by the Office of the Vice-Provost, Academic Programs) is for all proposals for new graduate programs. It will help to ensure that all evaluation criteria established by the Quality Council are addressed in bringing forward a proposal for a new program. Separate templates have been developed for other types of proposals.

Full name of proposed program: (i.e., Master of Arts in History; Master of Science in Sustainability Management)	Master of Health Science in Laboratory Medicine
Degree name and short form: i.e., Master of Arts, M.A.; Master of Science in Sustainability Management, M.Sc.S.M.	MHSc in Laboratory Medicine
Program name: i.e., History; Sustainability Management	Laboratory Medicine
Professional program:	Yes
Unit (if applicable) offering the program: i.e., site of academic authority. Where a program is housed elsewhere (in physical terms), this should also be indicated. If a new graduate unit is contemplated, please indicate here.	Department of Laboratory Medicine & Pathobiology
Faculty/division:	Medicine / Division 4
Dean's office contact:	Allan Kaplan, Vice Dean, Graduate and Academic Affairs
Proponent:	Rita Kandel, Chair, Laboratory Medicine and Pathobiology
Version date: (please change as you edit this proposal)	April 1, 2019

Development & Approval Steps	**Date (e.g., of external appraisal site visit, final sign off, governance meeting, quality council submission, ministry submission)**
New Program Consultation Meeting	September 13, 2018
Consultation Proponents/Dean's Office/Provost's Office	
Provost's Advisory Group	December 5, 2018
Decanal signoff *In signing off I confirm that I have ensured appropriate:* • compliance with the evaluation criteria listed in UTQAP section 2.3 • consultation with the Office of the Vice-Provost, Academic Programs early in the process of proposal development • Consultation with faculty and students, other University divisions and external institutions	Allan Kaplan, Vice Dean, Graduate and Academic Affairs, designate for Trevor Young, Dean, Faculty of Medicine (Division 4) January 29, 2019
Provostial signoff *In signing off I confirm that the new program proposal:* • Is complete • Includes information on all the evaluation criteria listed in UTQAP section 2.3	Susan McCahan Vice-Provost, Academic Programs February 4, 2019
External Appraisal	February 26, 2019
Unit-level approval (if required)	[date]
Faculty/divisional governance	[date]
Submission to Provost's office	
AP&P	[date]
Academic Board (if a new degree)	[date]
Executive Committee of Governing Council (if a new degree)	[date]
The program may begin advertising as long as any material includes the clear statement that, "No offer of admissions will be made to the program pending final approval by the Quality Council and the Ministry of Training, Colleges and Universities (where the latter is required)."	
Ontario Quality Council	[date]
Submitted to the Ministry (in case of a new degree)	[date]

New Graduate Program Proposal

MHSC in Laboratory Medicine
Laboratory Medicine & Pathobiology
Division 4

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Instructions: Please include all sections with page numbers and a full list of appendices in the table of contents. The Table of Contents will update automatically when you right-click on it and select “Update Field” and then “Update Entire Table.”

1 Executive Summary

Please provide a brief overview of the proposed program summarizing the key points from each section of the proposal. (You may wish to complete this section last.) This may need to be used on a stand-alone basis:

The Department of Laboratory Medicine and Pathobiology (LMP), with close collaboration with the Department of Obstetrics and Gynecology (OB/GYN), is proposing the creation of a two year full-time professional Master's graduate program (Master of Health Science degree) to educate clinical laboratory medicine scientists in one of two fields: Pathologists' Assistant (PA) or Clinical Embryology (CE). Enrollment is 10 students per year (5 PA and 5 CE students) who will complete 9.5 full course equivalent (FCE) courses. The name, Masters of Health Sciences (MHSc) in Laboratory Medicine, reflects the nature of the unique program which incorporates the two fields under a Laboratory Medicine framework and is acceptable to the community of laboratory scientists and physicians. Pathologists' Assistants (PAs) are involved in providing diagnostic services in anatomical pathology by applying knowledge of tissue and laboratory analysis of human specimens. Clinical Embryologists (CEs) provide clinical management related to assisted reproductive technology in clinical embryology laboratories. The academic rationale for the program is to provide education that imparts general core knowledge in laboratory medicine and specific basic and applied principles and skills of anatomic pathology or assisted reproductive technology (ART) required to work as high quality laboratory scientists. The nature of this graduate program equips trainees to apply their knowledge to complex decision making, to serious ethical issues and to develop a strong sense of personal accountability and intellectual rigour and independence. The university graduate education imparts deep content expertise and essential practical skills to address complex clinical problems and make evidence based judgements during the course of clinical practise.

In all Faculty of Medicine programs, the instructors will include tenured, clinical and status-only faculty. The faculty teaching this program are recruited from our very best educators who are committed to the learning objectives and outcomes of this program.

Critical research skills are taught to both interpret current research and to plan original research independently. Understanding the principles of research is essential since these two disciplines are dynamic and are constantly incorporating new concepts and techniques to improve healthcare. The curriculum will include lectures, student presentations, student reviews and reports and practica at the university teaching hospitals as well as the university affiliated Forensic Pathology unit. Students will also complete laboratory research projects at the university and teaching hospitals. The emphasis on student presentations and critical analysis provides skills for life long learning. The program will be monitored annually by an education committee that will have processes to assess courses and practica, to receive feedback and self-reflections from students, and student evaluations of courses and teaching faculty. Students will have the opportunity to attend career development and wellness sessions.

The time is right to launch this program since the medical community, the professional regulators and the lay public expect that clinical practitioners be well trained in their discipline. To accomplish this, professional masters graduate programs exist in Europe and the United States that teach appropriate academic and clinical standards of practice and

graduate students who are competent to meet the modern challenges of their professional work. Furthermore, there is an education gap in Canada as clinical scientists have been historically trained on the job through random and independent apprenticeship arrangements. Such training does not focus on delivering an understanding of the scientific underpinnings of the fields and a strong academic foundation to meet the dynamic complexities that are now part of today's clinical science professions.

2 Effective Date

Anticipated date students will start the program: Fall 2020
Program will first be subject to a cyclical review in 2021-22

3 Academic Rationale

Please use the headings below:

- Identify what is being proposed and provide an academic rationale for the proposed program (what is being created and why?).
- Explain the appropriateness of the program name and degree nomenclature.
- If relevant, describe the mode of delivery (including blended or online; placement, etc.) and how it is appropriate to support students in achieving the learning outcomes of the program.
- Context
  - Discuss how the program addresses the current state of the discipline or area of study. (Identify pedagogical and other issues giving rise to the creation of this program. Where appropriate, speak to changes in the area of study or student needs that may have given rise to this development.)
  - Describe the consistency of the program with the University's mission as specified within the *Statement of Institutional Purpose* and unit/divisional academic plan and priorities.
- Distinctiveness
  - Identify any unique curriculum or program innovations or creative components

The rationale for this professional MHSc is that highly qualified clinical laboratory scientists are essential in the delivery of medical laboratory health care in Ontario and worldwide. Our review of the educational landscape in laboratory science indicates this proposal is aligned with appropriate degree nomenclature, program name and educational norms when compared to the few existing programs in United States, United Kingdom and Canada. The degree name, Masters of Health Sciences (MHSc) in Laboratory Medicine, reflects the nature of the unique program that incorporates the two fields under a Laboratory Medicine framework and is acceptable to the community of laboratory scientists and physicians. The fields are named as such to align with what is currently used in practice.

The Department of Laboratory Medicine and Pathobiology (LMP) will be partnering with the Department of Obstetrics and Gynaecology (OB/GYN) at the University of Toronto (UofT) to deliver the MHSc program in Laboratory Medicine. Both are internationally recognized academic and clinical departments that have consistently achieved excellence in research, education and clinical practice. Hence, the faculty members in these two departments are

highly qualified to train these graduate students in professional laboratory scientist programs in two types of clinical laboratory scientist disciplines, Pathologists' Assistant (PA) and Clinical Embryology (CE), reflecting two professional fields in medical laboratory practice.

This type of program is unique to Canada and the world, and is meant to strengthen laboratory healthcare in an efficient and effective way by offering a core curriculum in laboratory sciences with overall goals followed by a stratified curriculum for PAs and CEs. Faculty in both LMP and OB/GYN strongly support the creation of this MHSc in Laboratory Medicine because it aligns with their individual departmental academic plans and strategic departmental priorities, and promotes interdepartmental teaching. The faculty, including all the Hospital Chiefs, (see Appendix H: Letters of Support) recognize the academic rationale and educational need of this combined professional program which teaches independent decision making, quality improvement and precision clinical lab practice.

Academic rationale for a professional graduate Master's program in LMP

This proposed health focussed professional graduate program is consistent with the University of Toronto's Statement of Institutional Purpose which specifies "The University of Toronto is committed to being an internationally significant research university with undergraduate, graduate, and professional programs of excellent quality." We aspire to achieve an international reputation for our MHSc in keeping with the high global rankings of UofT programs in the Faculty of Medicine.

LMP is a world-class academic department that has an excellent track record of training both laboratory physicians in anatomic pathology and doctoral graduate students in the study of pathogenesis of human disease. Our tenured, status only and clinical faculty are enthusiastic and committed to developing and actively participating in this much-needed new professional program. The department sits at the crossroads of basic science and clinical medicine, strategically placing itself in an excellent position academically to mount a high-quality graduate clinical laboratory sciences program. This is due to the presence of well-qualified dedicated faculty, excellent pathology and infertility resources at the teaching hospitals, an outstanding mix of anatomic pathology cases at the teaching hospitals, and an excellent scholarship track record of linking teaching and research in basic biomedical science and clinical laboratory science.

The MHSc in Laboratory Medicine will be offered by LMP. The department currently offers two research focused degrees: the MSc and PhD, both in this field of Laboratory Medicine. Approximately 200 doctoral stream graduate students (120 PhDs and 80 MSc) are currently enrolled in LMP. Our graduates are successfully employed with approximately 50% in post-secondary education, just under 30% in the private sector and 18% in the public sector (See U of T School of Graduate Studies 10,000 PhDs Project, 2000-2015). As well, LMP has been successfully training non-physician laboratory scientists for many years in the disciplines of clinical chemistry and clinical microbiology; both of these programs are accredited and trainees successfully sit for certification exams. Our graduates are working as laboratory professionals throughout North America. Thus, training clinical scientists aligns very well with the ongoing teaching in LMP carried out by our tenured, clinical and status-only faculty based at the university (St. George campus) and university-affiliated hospital based research institutions.

A brief history provides further rationale for this new LMP graduate program. In 1997, the Faculty of Medicine merged the clinical laboratory disciplines into one comprehensive academic department. The purpose of the merger was to facilitate strategic planning by laboratory physicians and scientists to embrace molecular and precision medicine, to enhance the culture of safe and efficient laboratory practices through quality assurance and to develop educational programs to meet the emerging requirements for delivering education through competency models with state of the art innovative programs linking education to biomedical research. LMP has since become a "full service department" within the Faculty of Medicine with successful educational and research programs that span the University of Toronto campus and the laboratory departments and research institutes of the teaching hospitals.

LMP has also been very responsive to societal and community needs by developing new educational programs within the department. When transfusion medicine training needed a home, LMP provided the faculty, staff and resources to successfully initiate and integrate the teaching and clinical training of transfusion medicine physicians since they functioned mostly as laboratory physicians. When there was an acute need for forensic pathology training in Ontario and in Canada, LMP rose to the occasion and established a very successful Royal College of Physicians and Surgeons of Canada accredited program whose certified graduates now populate forensic units in Ontario and elsewhere. Prior to this, there were no accredited forensic training programs in Canada and there was no mechanism to certify forensic pathologists. Thus, they either had to be certified in the United States or United Kingdom or learn on the job without having had formal training.

We are now at the same point in Canada with clinical laboratory scientists. Most PAs and CEs are working without formal training in accredited programs and this educational gap needs to be filled. LMP has the academic and clinical expertise to meet this need to train graduates who will be eligible for certification, at present from the American Society for Clinical Pathology (ASCP) Board of Certification. There are no similar existing programs being offered at UofT, and in Ontario, one small PA program exists at Western University.

Advances in medicine through breakthroughs in clinical medicine, in basic and translational research and in technology, require enhanced laboratory services since approximately 70% of medical decisions rely on laboratory tests and services. There is an increasing demand across Canada and worldwide for well-trained clinical laboratory scientists who function in assisted reproductive technology or, as physician extenders to oversee and manage the preparation, examination and utilization of human tissues in the setting of surgical, autopsy and forensic pathology, and in biomedical research. The degree program will include the following distinctive features:

- University of Toronto affiliated teaching hospitals are major national tertiary/quaternary health care centers with a unique case mix, including rare cases referred from across Canada. This exposure to material provides a unique and in-depth opportunity for learning. In addition, LMP and its teaching hospitals promote subspecialized pathology services including some that are limited in other provinces, such as the largest transplant service in North America, soft tissue pathology, endocrine pathology etc. Many of our pathologists are national and international consultants in diagnostic pathology and do both one-on-one and

classroom teaching. Thus, our program will offer a unique opportunity for both general and subspecialized PA training under the supervision of dedicated internationally renowned pathologists. Some of our hospitals, such as Princess Margaret Cancer Centre, Sinai Health System and SickKids handle unique complex pathology cases associated with very subspecialized services.

- A unique feature will be the ability to receive applied training in cancer, stem cell and other types of biobanking. Biobanking refers to the process by which samples of bodily fluid or tissue are collected for research use to improve our understanding of health and disease. This will involve didactic classroom teaching and applied wet laboratory protocols and/or experiments. The rationale is that cancer related biobanking is evolving nationally and internationally as a requirement for the delivery of precision medicine. Many hospitals will soon require some biobanking capability and there will be a need for PAs to extend the scope of pathologist practice in this area. Sophisticated regulations recently emerged for obtaining and maintaining tissues for research and clinical trials which require an in-depth understanding of the basic and applied science related to tissue procurement and handling. In Toronto, we have access to two of the largest and most advanced biobanking facilities in Canada, which we will access in order to train PAs in this emerging field of clinical laboratory practise. Similarly, many CEs actively participate in research, and biobanking of excess materials for research purposes is expanding in the ART field. Thus, best practice in biobanking is a topic relevant to both the CE and PA fields.

- With precision medicine beginning to appear in clinical practice, there is a strong rationale for having PAs know how to handle tissues for accurate molecular analysis. To do this effectively and efficiently, they will require an understanding of relevant cell and molecular biology. The Province of Ontario, through Cancer Centre Ontario, is a pioneer in molecular pathology, and as a result, our graduates will have the opportunity to learn firsthand state-of-the art advanced molecular pathology.

- Precision medicine will be further supported by the development of Artificial Intelligence (AI) based methods, some of which rely on big data. A unique aspect of this program will be exposing our students to excellent quantitative approaches for mining molecular and cell biology information and data. The students will learn how tissue handling, selection and preservation impact on digital pathology in which digitized histopathology slide images are easily stored, visualized, shared and utilized using computational tools. The University of Toronto is an international leader in AI and LMP will facilitate the application of AI in clinical laboratory medicine.

- Currently, the apprenticeship model of training for CEs allow individuals to gain technical skill over a protracted period of time, with little opportunity for theoretical training. This unregulated apprenticeship approach has the potential to put patients at risk. Thus, there is a rationale to train CEs in the fundamental knowledge of reproductive biology and pathobiology since it forms the underpinnings of a solid understanding of the processes involved and enables well informed trouble shooting skills and decision making, which is essential for CEs to

become valued members of the ART team. The University of Toronto has unique academic strength in reproductive biology and development, infertility, and molecular biology that will facilitate the creation of a high quality, leading-edge, robust program. New approaches and techniques in ART are continually introduced and adopted by ART clinics, and the CEs need to be prepared to assess the research supporting these advances in terms of their quality and potential impact on the field.

- Establishment of a Simulation and Skills Lab which is supported by LMP and the Department of Obstetrics and Gynecology. They will supply equipment and personnel to provide hands-on training.

4 Fields/Concentrations

- Description of fields/concentrations, if any. (Please note: graduate programs are not required to have fields/concentrations in order to highlight an area of strength or specialization within a program.)

This degree program will have two fields of study, PA and CE. The Pathologists' Assistant (PA) field prepares students in a discipline that employs highly trained clinical laboratory scientists who demonstrate highly responsible medical or biomedical laboratory based expertise and work under the supervision of medically qualified pathologists. The discipline has evolved to provide diagnostic services in anatomical pathology laboratories through the handling, preparation and utilization of human tissue and fluids for diagnostic and for research purposes.

The discipline of Pathologists' Assistant encompasses clinical scientists who are involved with the provision of diagnostic services in anatomical pathology, a discipline in which physicians specialize in the diagnosis and management of human disease by laboratory methods. The role of the PA is to develop and apply the knowledge of tissue and laboratory analysis to assist in the diagnosis and treatment of individual patients. They provide services in surgical, autopsy and forensic pathology, and in laboratory research programs in the biomedical area both in academic and non-academic (industry, pharmaceutical and biotech companies, government regulatory labs, public and private health agencies) laboratories.

Pathologists' Assistants (PAs) are members of the clinical laboratory discipline of Pathologists' Assistant and are currently trained in Canada on the job without a formal academic foundation. Very recently, PAs have been encouraged by the medical laboratory community to obtain a professional MHSc in an accredited academic program to be eligible for certification to work in highly responsible laboratory positions under the supervision of medically qualified pathologists. PAs require competencies in many areas that are best taught at the Master's level including complex problem solving, self-directed and independent learning, quality assurance, professionalism, research integrity and ethics and communication skills. Consequences of errors in their performance or judgement may lead to serious medical errors in the delivery of healthcare.

Clinical Embryology (CE) is a discipline created to provide highly trained CE healthcare professionals who are responsible for all clinical and management decisions related to assisted reproductive technology (ART) in the clinical embryology laboratory and infertility research labs. Currently, the apprenticeship model of training allows individuals to gain technical skill over a protracted period of time. The apprenticeship approach alone, while appropriate in the early days of the field, is not sufficient for the sophisticated health care offered today. Fundamental knowledge of reproductive biology, pathobiology and research are serious gaps in the current apprentice training. The knowledge forms the underpinnings of a solid understanding of the processes involved and enable evidence based trouble shooting skills and decision-making. This is essential for CEs to provide the value expected from a key team leader. The University of Toronto has academic strength in reproductive biology and development, infertility, and molecular biology that will facilitate the creation of a high quality, leading edge, robust academic graduate program for the CE field of laboratory science.

Clinical Embryologists (CEs) are trained to be responsible for all clinical and management decisions related to assisted reproductive technology (ART) in the clinical embryology laboratory. They work in conjunction with physician input. The discipline requires that the clinical embryologist employ numerous technical skills with varying degrees of complexity. Errors in performance and judgement may lead to serious consequences for those under their care who are seeking reproductive assistance.

ART was created with the first human *in vitro* fertilization conception and live birth in 1978. Since this Nobel Prize achievement by Drs. Patrick Steptoe and Robert Edwards, the discipline has developed to address infertility which is estimated to affect one in six Canadian couples. In addition to infertility patients, ART is used for the preservation of gametes to preserve fertility prior to gonadotoxic drugs for pre-pubertal and reproductive-aged oncology patients, and is accessed by members of the LGBTQ community as well as by carriers of genetic diseases. For example, here are some of the work CEs carry out:

1. handling and micromanipulation of gametes (oocytes and sperm)
2. gamete quality assessment
3. sperm cryopreservation and thawing
4. *in vitro* fertilization
5. preimplantation embryo culture and assessment
6. catheter loading for embryo transfer
7. intracellular sperm injection (ICSI)
8. sperm selection
9. laser-assisted embryo hatching
10. embryo cryopreservation and thawing
11. tissue handling for testicular and ovarian samples
12. sperm/spermatid isolation from testicular biopsy or epididymal aspirations
13. trophectoderm biopsy for preimplantation genetic testing
14. oocyte cryopreservation and thawing
15. time lapse embryo imaging and interpretation
16. laboratory workflow and sample tracking

The MHSc Laboratory Medicine program in the field of Clinical Embryology will prepare leaders in assisted reproductive technology (ART) by providing breadth and depth of

knowledge, and ensuring that students have the ability to apply and communicate it. Critical thinking and continuous quality improvement are themes that weave throughout the program. The synthesis of these with an understanding of the ethical, scientific and managerial challenges will provide the basis for a career as a clinical embryologist.

5 Need and Demand

- Provide a brief description of the need and demand for the proposed program focusing, as appropriate, on student interest, societal need, employment opportunities for prospective graduates, interest expressed by potential employers, professional associations, government agencies or policy bodies and how this has been determined.
- How is the program distinct from other programs at U of T? (Address, if relevant, how this program might affect enrolment in other related programs offered here.)
- With specific reference to the impact on need and demand, describe how the proposed program relates to (is similar to or different from) existing programs offered by other universities in North America and Internationally (with specific reference to Canadian and Ontario examples). In doing this, you may wish to append a table showing other programs.

The current state of PA and CE disciplines in Canada

There is a societal need to train clinical laboratory scientists in graduate programs to ensure excellence in academic and applied science training in accredited programs that prepare trainees to successfully achieve certification. The United States and the United Kingdom are ahead of Canada in establishing such accredited programs with opportunities for individual certification. In Canada, there are four small existing/emerging programs for PAs in Canada. These are accredited by the US based National Accreditation Agency for Clinical Laboratory Sciences (NAACLS). Although Ontario is the largest province, in terms of population and health services, there is only one PA program at the Master's level at Western University. This 2 year program trains 5 students per year and is insufficient for current and future healthcare needs. It should also be noted that the programs in other provinces include 2 year MSc programs at University of Alberta (2 students per year), University of Calgary and Manitoba, (2-3 students per year). Our program will train 5 PAs per year which is the most number of trainees in a program in Canada. A list of high calibre PA programs can be found in Appendix G.

The PA section of the Canadian Association of Pathologists (CAP) will be phasing out the current informal and apprenticeship routes that allowed for professional membership in their section. This creates new needs for formal education and the route being demanded by employers (pathology departments) is professional Masters graduate programs. The Canadian Chairs of Pathology and Laboratory Medicine are beginning to work with CAP and the Canadian Certification Council of Pathologists' Assistant (CCCPA) to establish standards of accreditation; current processes and standards need to be revised and redeveloped. By 2018, all PAs will be certified. It is expected that all new participating PAs in Canada will be graduates of an accredited Master`s degree program. Moreover, PAs are in demand for the expanding fields of biobanking, autopsy services, pathology research, forensic pathology, and the pharmaceutical and biotechnological industries. Thus, the job market for highly

qualified laboratory scientists with expertise in tissue and fluids is expanding. Currently (January 2018), there are eight advertisements for PAs in Canada.

In the United States, PAs are members of the American Association of Pathologists' Assistants (AAPA). The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) Board of Directors voted in 1995 to accept the Essentials (now Standards) of Accredited Training Programs for the Pathologists' Assistant, establishing a process of accreditation for Pathologists' Assistant training programs. To earn certification the PA must graduate from a NAACLS accredited training program and subsequently pass the American Society for Clinical Pathology (ASCP) Board of Certification examination called the PA (ASCP). We plan to create a rigorous graduate program in Laboratory Medicine in Toronto and seek accreditation by the NAACLS. This will allow our graduates to be eligible to write the PA (ASCP) certification examination. As noted above, we will also work with Canadian bodies including the Canadian Chairs of Pathology and Laboratory Medicine to develop equivalent Canadian accreditation and certification processes that reflects best practise in clinical laboratory science.

In 2007, the Canadian Association of Pathologists (CAP) created the Section for Pathologists' Assistant to establish some informal standards of professional ethics, practical education and key competencies creating informal Canadian training guidelines for PAs. However beginning in 2016, the PA section of the Canadian Association of Pathologists (CAP) is phasing out the current informal and apprenticeship routes that allowed for professional membership by 2018.

The Ontario government Ministry of Health and Long Term Care (MOHLTC) has previously demonstrated their commitment to addressing human fertility needs by providing a seventy-million-dollar annual budget for public funding of ART, with concomitant quality oversight. This has led to a need for high quality educational programs to meet the increased demand for well-trained clinical embryologists to provide ART services in the province. Presently in Canada, CEs are trained informally using an apprenticeship model, where the laboratory director oversees and validates the training of new individuals in their own specific clinical laboratories. These trainees generally have a BSc in a biological discipline, before they begin their unregulated apprenticeship in the clinical lab, with little or no laboratory experience. Recently, the field has seen a slight rise in the employment of graduates with a thesis-based Master's degree in a biomedical field but it is typically unrelated to reproduction or clinical embryology training.

Due to the clinical responsibilities of the job, many laboratory directors do not have sufficient time, teaching skills or resources to adequately educate their staff in all techniques. The volume of clinical cases in many clinical ART centres does not allow 'downtime' needed for training. Most important, any training provided lacks rigorous teaching of reproductive physiology and the theory underlying the techniques to be mastered. ART is a continuously evolving field with new tests and approaches emerging that require critical evaluation and appropriate implementation. CEs are practitioners as they provide advice/insight that directly impacts the patient's care. Thus, best practice has evolved in Europe and the United States to have a formal graduate training program in a university setting to ensure these individuals have a solid academic foundation to better make these critical decisions and to seek out, understand and apply new information derived from research studies directly to the clinic.

There is a two-fold need for CE education in Canada. Firstly, there is a need for trained embryologists in Canada. Secondly, CE training needs to move from an apprenticeship model to a formal academic professional model.

Formal certification processes, however, do exist in the United States and the United Kingdom. The international medical community in the United States and United Kingdom are well ahead of Ontario and Canada and have established graduate programs to train CEs. With this driving our educational planning, as with the PA field, the laboratory science educators at the University of Toronto are well positioned to fill the need and mount a rigorous and comprehensive CE training program.

Currently, there is an academic focused infertility clinic at Sinai Health System. Physicians from OB/GYN working in this clinic recognized the need for our graduate professional program and are heavily involved in the creation and design of our MHSc. There are also a number of other high profile clinics within the city, which are serviced by some physicians who hold university clinical appointments in the Faculty of Medicine. The academic strength of innovative teaching and research in the Division of Reproductive Endocrinology and Infertility in the Department of Obstetrics and Gynaecology will provide faculty to fill the need for CE professional graduate education.

The European Society of Human Reproduction and Embryology (ESHRE) guidelines recommend "clinics that perform up to 150 [oocyte] retrievals and/or cryopreservation cycles per year should have always a minimum of two qualified clinical embryologists." This estimate would translate to at least 300 embryologists required in Canada for approximately 30 000 IVF cycles a year. Currently, there are approximately 150 embryologist members of the Canadian Fertility and Andrology Society (CFAS). There are some clinical embryologists who are not members of CFAS since it is not necessary to be a member to be able to practice in Canada. In both 2016 and 2017, there were more than 20 nationally placed advertisements for jobs for embryologists, attesting to the need. Importantly, this number does not reflect time needed for more complex cases, such as IVF performed with spermatids isolated from testicular biopsy and ovarian tissue cryopreservation, which are increasingly being offered by the more advanced clinics. Due to the previously noted influx of MOHLTC support, the number of IVF cycles (treatments) has doubled in the last two years. In addition, the number of high acuity services such as embryo biopsy has likewise doubled. Thus, there is a need for establishing an academic program that will train CEs for the job market.

In the United Kingdom, the Human Fertilization Embryology Authority (HFEA) requires that all embryologists undergo a "recognized training scheme" and be registered with the Health Care Professional Council (HCPC) as a clinical scientist with specific expertise in clinical embryology. Likewise, the standards of Association for Clinical Embryologists of the United Kingdom state that "all embryologists should have undergone a training scheme….such as MSC training in reproductive science."

In Canada, there is currently only a voluntary embryology exam, but it is anticipated that more formal mandatory testing will be required in the near future, especially by the government of Ontario. The University of Toronto MHSc will be positioned to prepare clinical embryology graduates for certification by arm's length professional bodies. Please

refer to Appendix G for a list of comparable programs in clinical embryology (or its closest equivalent).

There is also a global need for trained embryologists particularly in emerging economies. We anticipate an interest from international students once our program is well established. This is consistent with the University of Toronto's plans to expand its international student cohorts, including in programs that train health care professions. LMP is able to meet this goal as we have an excellent track record in training international pathologists and laboratory physicians. What helps in this regard as well is the diverse nature of our clinical teaching faculty, which will result in global interest in our new training program.

6 Enrolment

- Please provide details regarding the anticipated in-take by year, reflecting the expected increases to reach steady state. Include approximate domestic/international mix. This table should reflect normal estimated program length. (Please adjust the table as necessary.)
- Please provide an explanation of the numbers shown and their relation to the Faculty/division's enrolment plan. Please be specific where this may differ from approved enrolment plans.

The program will have an intake of 10 domestic students (5 for PA, 5 for CE), with an anticipate program start date of Fall 2020. It will remain at this state for the foreseeable future (i.e. steady state by 2021-2022). As noted under the heading Need and Demand, we expect a sufficient pool of high quality applicants to admit into this program. International enrolment will be considered once the program is well established (i.e. 2021/22 or 2022/23) and will count as additional students above the planned 10 domestic students. These enrolment projections are reflected in the Faculty of Medicine's five year budget plan. The program will be starting with a small group of students and is open to expanding this program in the future.

Table 1: Graduate Enrolment Projections*

	2020 - 21	2021 –22*	2022 - 23	2023 - 24	2024 – 25
Year 1	10	10	10	10	10
Year 2		10	10	10	10
Total	10	20	20	20	20

*Please note when the program expects to reach steady state.

7 Admission Requirements

- Provide a formal statement of admissions requirements, as they will appear in the SGS Calendar entry.
- Explain how the program's admission requirements are appropriate for the learning outcomes established for completion of the program.
  - How will they help to ensure students are successful?
    - Provide sufficient explanation of any admissions requirements that are above or in addition to the normal minimum requirements for a graduate program at this level (including higher GPA, specific knowledge or skills – e.g., prior calculus; prior professional practice; additional language, interviews, portfolio, letters of intent, etc.) For example, are there specific undergraduate or master's programs from which students may be drawn?

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies and must also satisfy the additional admission requirements stated below
- Admission is based on demonstrated exceptional scholarly achievement, using the following criteria:
  - one page statement summarizing how this program will contribute to the advancement of the applicants' professional goals identifying their field of preference.
  - curriculum vitae (CV)
  - 2 letters of reference, one of which should be familiar with the candidate's scholarly activities
- Applicants must have an appropriate Bachelor of Science degree (B.Sc.) from a recognized university, with an average of at least B+ in the last two years of study. The students must have a demonstrated interest in human biological and life sciences, preferably with a major or specialist program in the life sciences. These programs prepare students for the study of biomedical science, for fluency in biomedical terminology, and for critical evaluation of biomedical literature. Courses in human anatomy and physiology are desirable.
- All potential students will be interviewed prior to final acceptance into the program. The initial selection of students will be based on a combination of their academic record, individual statement and letters of reference. These students will be asked to participate in an interview with the Program Coordinator to determine the fit with the program and student's goals. Furthermore, the interview will provide initial direction for the Program Coordinator to identify appropriate practicum placements.
- Applicants who were educated outside Canada, whose primary language is not English, and who graduated from a university where the language of instruction was not English, must demonstrate proficiency in the English language through the successful completion of the:
  - Test of English as a Foreign Language (TOEFL) with the following minimum scores: Internet-based TOEFL: 100/120 and 22/30 on the writing and speaking sections.

- Michigan English Language Assessment Battery (MELAB) Web; Required score: 95
- International English Language Testing Systems (IELTS); Required score: 8.0 (Academic) with at least 6.5 for each component
- Certificate of English Proficiency (COPE); Required score: 86 minimum total with at least 22 each component and 32 in writing.
- School of Continuing Studies, University of Toronto, "Academic English" course Required score: a final grade of B in Level 60 (Advanced)

8 Program Requirements, Learning Outcomes, Degree-Level Expectations (DLEs), and Program Structure

- In a curriculum map, or in the table below, or in another format appropriate for the discipline, state the program learning outcomes and program requirements, and show how the program learning outcomes are appropriate for the degree level expectations.
- Discuss how the design, structure, requirements and delivery of the program are appropriate for the program learning outcomes and degree-level expectations. Please include:
  - The sequencing of required courses or other learning activities, etc.
  - The mode of delivery of the program (face-to-face; blended or online; placement, etc.) and how it is appropriate to support students in achieving the learning outcomes of the program and the degree-level expectations. Whether the program will be offered on a full-time basis only or will also be offered part-time and if so, why.
  - The program length for both full-time and part-time students. Address how the program requirements can reasonably be completed within the proposed time period.
  - Describe how the specific elements of the curriculum (e.g., Internships, etc.) will be administered.
  - A clear indication of how faculty "scholarship and research is brought to bear on the achievement of Degree Level Expectations" (UTQAP 1.1)
  - For research-focused graduate programs, provide a clear indication of the nature and suitability of the major research requirements for degree completion. For professional graduate programs, how the research expectations of the degree level expectations will be met.
  - Describe how the program structure and delivery methods reflect universal design principles and/or how the potential need to provide mental or physical health accommodations has been considered in the development of this program
  - Please include the standard text which has been inserted in the box.

Whereas the Province's Quality Assurance Framework requires that students complete a minimum of two-thirds of courses at the graduate level, the University of Toronto requires graduate students to complete all of their course requirements from amongst graduate level courses. This proposed program complies with this requirement. The program is offered only as a full-time two year program since there is progressive development throughout the curriculum that students must take in lockstep so that foundational knowledge is built and forms the basis to accumulate expert knowledge in one of the two fields. Most of the courses are face-to-face, combined with student presentations of assigned peer-reviewed journal articles and class discussions on the topic of the day. Emphasis is on quality of research, identification of gaps in knowledge and importance for clinical care which is focused on in the practicum courses. The courses are presented by tenured biomedical scientists, clinician-scientists, academic clinicians and status-only scientists appointed at the University of Toronto.

Physical health or mental health accommodations are handled through Faculty of Medicine and university student support services. There is no alternate pathway through the program so accommodations will be focussed on assisting the student in completing the program which is structured with minimum flexibility. It is necessary to cover all the material presented in courses, practicums and capstone projects. Inability to do so will require repetition of the year depending on the extent of absences and thus time to degree will be extended. This information will be communicated to students during the recruitment phase and again in the introduction to the program for new students.

The timetable below (Table 2) shows the sequencing of required courses; initial core courses designed for all clinical laboratory scientists provide the foundations and the essential knowledge for both PAs and CEs working in biomedical health care environments. This is followed by discipline specific courses that build on the information in the initial core courses. These discipline courses are designed to be more interactive and prepare students for the practicum components of the program where knowledge is applied in clinical type settings. The capstone course is designed to create a research environment in which much of the knowledge in the earlier courses is applied to investigate a biomedical research problem. Thus the program is designed to link the fundamental science learning closely to the applied science learning. The design is such that repetition of technical skills occur so that the students become proficient as they move through their applied practice.

The PA and the CE faculty will collaborate to design and present a core curriculum that covers many aspects of training such as laboratory quality and management, biobanking, principles of research bioethics and research integrity, research methodology and biostatistics. The capstone project (LMP 2005Y) will be a core component of the program. Students will select topics for a research project with the assistance of the field director. Students will spend a significant amount of time conducting research, under the supervision of a faculty mentor whose research interest align with the student's interest. Students will be assessed based on their performance during the course and final written and oral reports. This capstone will significantly add to the academic nature of the program and enhance the job opportunities for our future graduates, especially at research institutions, in industry and in clinical trial settings where strong academic credentials are valued.

Description of Curriculum for the field of Pathologists' Assistant

The foundation core courses focus on providing a solid understanding of the science of molecular biology, *Cell and Molecular Biology* (LMP 2000H). The PA specific courses *Basic Principles in Human Pathobiology* and *Pathophysiology* (LMP 2200H) and *Histology and Human Pathology of Organ Systems* (LMP 2201H) utilize this molecular biology information to provide the student with an understanding of the cellular and system origins of diseases to which PAs are exposed to in their daily work. The ability to critically appraise current scientific literature and laboratory practice is emphasized and is further considered in *Biomedical Research Methods* (LMP 2001H) in the first semester and *Biostatistics* (LMP 2004H) in term three. The early introduction of *Biomedical Ethics* (LMP 2003H) sets the stage for the type and quality of discourse and professional behaviour expected of the students. Ethical considerations transcend virtually all aspects of laboratory science education including research ethics, diversity, consideration of respectful handling of human tissues, and professionalism in interactions with colleagues and patients. This course will ensure that ethics and professionalism is explicitly taught to the students (LMP 2001H).

Early on, the students are introduced to laboratory processes and standards in *Clinical Laboratory Management* (LMP 2002H) which are essential concepts for those working in a clinical laboratory setting. This learning will continue in the series of practicums.

Having solidified the cognitive skills, the student will then learn the technical skills in terms 3, 4, 5 and 6 in the series of practicum courses (LMP 2202H-2210H). The practicums are organized along organ systems and in each, the student begins at an introductory level and proceeds to intermediate and then expert level. The PAs are trained in three areas of anatomic pathology that they will likely encounter upon graduating: surgical pathology, autopsy pathology and forensic pathology.

The *Capstone Project* (LMP 2005Y), spread over the last three terms, will pull together the knowledge acquired in the fundamental sciences, *Biomedical Research Methods* (LMP 2001H), *Biostatistics* (LMP 2004H) and *Biomedical Ethics* (LMP 2003H). Students will be asked to apply their knowledge to an important question to be answered scientifically. They will first identify a gap in scientific biomedical knowledge to explore and then learn to design and analyze research protocols. The PA students will use the fundamental knowledge gained in LMP 2200H (*Basic Principles in Human Pathobiology and Pathophysiology*) and LMP 2201H (*Histology and Pathobiology or Organ Systems*) to choose an area to work on. The Capstone Project (LMP 2005Y) involves considerable communication opportunities and teaches students to be critical and defend their scientific and applied ideas in front of peers and faculty.

Description of Curriculum for the field of Clinical Embryology

The foundations of ART are molecular biology (*Introduction to Cell and Molecular Biology*, LMP 2000H), and reproductive physiology (*Advanced Reproductive Physiology,* LMP 2100H). These two courses provide the student with the cellular and system origins of reproduction. To complement this is an introduction to laboratory processes and standards in *Clinical Laboratory Management* (LMP 2002H).

Ethical considerations transcend virtually all aspects of this education from research ethics, to diversity consideration to disposition of gametes, and a working knowledge of this will be provide by *Biomedical Ethics* (LMP2003H). This course will ensure that professional capacity is explicitly taught to the students.

Following these foundational courses, the student layers a deeper understanding of embryology and the genetics behind it in *Human Embryology* (LMP 2101H) and *Reproductive Genetics* (LMP 2103H). At the same time, basic clinical laboratory embryology is introduced in *Foundations in ART (LMP* 2102H) and then more sophisticated application is taught in *Applied Methods in ART* (LMP 2104H).

In term four, the students will apply their knowledge in three related courses: *Innovations in* ART (LMP 2105H), *Current Topics in Causes and Treatment of Infertility* (LMP 2106H) and *Applied ART Laboratory Decision Making* (LMP 2107H). These courses will address controversies in the delivery of ART. This requires an appreciation of the gaps in knowledge and the ability to critically appraise current scientific literature and laboratory practice. The early introduction of research methods (Biomedical Research Methods, LMP 2001H) will set the stage for the type and quality of discourse expected of the students.

Having solidified the cognitive skills, the student will learn technical skills in terms 5 and 6. *Clinical Embryology Laboratory Simulation I* (LMP 2108H*) and Clinical Embryology Laboratory Simulation II* (LMP 2109H) will give CE students the minimum skills required to work in a clinical embryology laboratory. *ART Laboratory Rotation* (LMP 2110H) will layer the real-life element, providing exposure to interprofessional collaboration.

The capstone project (LMP2005Y) will pull together the knowledge acquired in *Foundations in ART* (LMP 2102H), *Biomedical Research Methods* (LMP 2001H), *Biostatistics* (LMP 2004H) and *Biomedical Ethics* (LMP 2003H) and ask the student to apply it to a question to be answered scientifically.

In summary, the introductory level will be standard procedures and the science behind them. (LMP 2000H, 2003H, 2100H, 2101H, and 2103H). This will be followed by innovations (LMP 2105H) which will require analysis of processes and procedures, and will ask the student to combine the content from Applied Methods in ART and Clinical Lab Management and Biomedical Research Methods and Biostatistics. Finally, the student will be asked to layer economic and management factors to efficacy factors in Applied ART Laboratory Decision Making.

Table 2. MHSc in Laboratory Medicine: Course Time Table

	TERM 1 Fall	TERM 2 Winter	TERM 3 Summer	TERM 4 Fall	TERM 5 Winter	TERM 6 Summer
CORE	Cell and Molecular Biology (LMP 2000H, 0.5 FCE)	Clinical Lab Management (LMP 2002H, 0.5 FCE)	Biostatistics (LMP 2004H, 0.5 FCE)	Capstone Research Project (LMP 2005Y, 1.0 FCE)		
	Biomedical Research Methods (LMP 2001H, 0.5 FCE)	Biomedical Ethics (LMP 2003H, 0.5 FCE)				
Clinical Embryology	Advanced Reproductive Physiology (LMP 2100H, 0.5 FCE)	Human Embryology (LMP 2101H, 0.5 FCE)	Reproductive Genetics (LMP 2103H, 0.5 FCE)	Innovation in ART (LMP 2105H, 0.5 FCE)	CE Lab Simulation I (LMP 2108H, 0.5 FCE)	ART Lab Rotations (LMP 2110H, 0.5 FCE)
		Foundations in ART (LMP 2102H, 0.5 FCE)	Applied Methods in ART (LMP 2104H, 0.5 FCE)	Current Topics in Causes and Treatment of Infertility (LMP 2106H, 0.5 FCE)	CE Lab Simulation II (LMP 2109H, 0.5 FCE)	
				Applied ART Laboratory Decision Making (LMP 2107H, 0.5 FCE)		
Pathology Assistants	Basic Principles in Human Pathobiology and Pathophysiology (LMP 2200H, 0.5 FCE)	Anatomy and Pathology of Organ Systems (LMP 2201H, 0.5 FCE)	Practicum in Surgical Pathology I (LMP 2202H, 0.5 FCE)	Practicum in Surgical Pathology III (LMP 2204H, 0.5 FCE)	Practicum in Autopsy Pathology (LMP 2206H, 0.5 FCE)	Practicum in Surgical Pathology V (LMP 2209H, 0.5 FCE)
			Practicum in Surgical Pathology II (LMP 2203H, 0.5 FCE)	Practicum in Surgical Pathology IV (LMP 2205H, 0.5 FCE)	Practicum in Forensic Pathology (LMP 2207H, 0.5 FCE)	Practicum in Surgical Pathology VI (LMP 2210H, 0.5 FCE)
					Biobanking for Research (LMP 2208H, 0.5 FCE)	
	Elective* (0.5 FCE)					

	Credits
Core	3.5
CE field	5.5
PA field	5.5
Core Elective	0.5

**Students select one elective from the graduate studies calendar. Can be taken in any of the 6 terms.*

This table provides information on how each of the Degree Level Expectations are evaluated and why these methods are appropriate.

Table 3: Evaluation of Learning Objectives

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	**Master's Program Learning Objectives and Outcomes**	**How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes** Note: please see the curriculum map in Appendix F to support the explanation in this column.
Expectations: **This MHSc in Laboratory Medicine is awarded to students who have demonstrated:**		
1. Depth and Breadth of Knowledge A systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the academic discipline, field of study or area of professional practice.	Depth and Breadth of Knowledge is defined in Laboratory Medicine as general and specific knowledge of a broad range of scientific and medical concepts, principles and applied practical skills that allow for use of evidence based pathology and embryology knowledge and information to assist in handling and assessing pathological tissue specimens and fertility related tissue for the diagnosis and treatment of human disease and infertility. *Core Outcomes:* • Understand the fundamental cell and molecular biology principles of pathology and reproductive technology used in the clinical laboratory. • Identify gaps in knowledge that lead to research and clinical investigations • Understand the principles of laboratory quality assurance *PA Outcomes:* • Identify and list the etiology and pathogenesis of human diseases • Recognize tissue specimen variation and decide which laboratory approaches are best suited to each type of variation	The program design and requirements that ensure these student outcomes for depth and breadth of knowledge are: *Core-specific program design*: An introduction of molecular and cell biology will be provided in LMP 2000H and applied in human embryology, LMP 2101. These principles will also be applied in the understanding of the genetic underpinnings for fertility & reproductive diagnosis in LMP 2103H. These courses will combine didactic lectures with student presentations. An understanding of molecular and cell biology will be applied for CE students in LMP 2106H as emerging literature relevant to clinical embryology is presented and critically discussed. PA students will integrate cell biology in the understanding of human pathology as types of disease categories are introduced in LMP 2200H through didactic lectures. LMP 2201H will build on some aspects of LMP 2200H and will focus on disease in certain organs and tissues. A central philosophy of the program is to question the known literature and to be self-reflective. In all courses, but particularly the later courses, instructors encourage this kind of critical and reflective thinking in students - through student presentations and discussions. Quality assurance is a critical practice for all clinical laboratories. Fundamental knowledge of quality assurance will be provided in LMP 2002H, and this knowledge will be applied in courses LMP 2104H and LMP 2105H for CE students and throughout all the practicum series for PA students [LMP 2202H to LMP 2210H].

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
	CE Outcomes: • Understand reproductive physiology and the underlying pathophysiology leading to common causes of infertility • Know current ART procedures, their indications, strengths, and limitations	*PA-specific program design:* Students will be presented important context to view and classify disease conditions. LMP 2000H - general to normal cell and biology; LMP 2200H - general to disease; LMP 2201H – disease in organ systems. Practica will be organized by organ system. Students will begin learning about each organ tissue type at the introductory level and progress to intermediate and then to expert as they move through the program (as indicated by colour). *CE-specific program design:* CE students are introduced to causes of infertility in the first 3 terms, including those that result from developmental sequelae. This general information is reinforced with a deeper understanding through critical analysis of current relevant literature in LMP 2106H. The objective is ensure students have a solid foundation to understand the application of specific technologies to these populations. Students will learn the general approaches to infertility treatment in LMP 2100H. Specific aspects of each of these approaches as they pertain to the andrology and embryology laboratories will be presented in LMP 2102H and 2104H. This will be applied in LMP 2105H as students explore and discuss nascent changes in existing technologies and impact of technological advances in the near future. Students will develop decision-making skills as to the appropriate application of existing techniques in LMP 2107H.
2. Research and Scholarship A conceptual understanding and methodological competence that • Enables a working comprehension of how established techniques of research and inquiry are used to create and interpret knowledge in the discipline;	Research and Scholarship is defined in Laboratory Health Sciences as the ability to interpret and synthesize scientific information and medical findings to understand the pathobiology of human disease. Core outcomes: • Critically read and interpret research and clinical literature in the disciplines of pathology or ART • Understand the principles involved in developing a viable research proposal	The program design and requirements that ensure these student outcomes for research and scholarship are: Students are introduced to overall research approaches in LMP 2000H and LMP 2001H, which will be built upon in the Biostatistics course (LMP 2004H). These courses will provide the basic tools to critically review the relevant literature within their respective streams. For CE students, examples of key studies leading to development of laboratory procedures in the embryology lab will be presented in terms 3 and 4, with the students applying their reviewing skills in LMP2106 and 2107, and putting the skills into practice in their

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
• Enables a critical evaluation of current research and advanced research and scholarship in the discipline or area of professional competence; and • Enables a treatment of complex issues and judgments based on established principles and techniques; and, on the basis of that competence, has shown at least one of the following: • The development and support of a sustained argument in written form; or • Originality in the application of knowledge.	• Critically assess technologies for their appropriate use and effectiveness	capstone project. For PA students, the introduction to research provided in the core courses will form the basis for further critical literature review and interpretation necessary for their capstone project. The students are introduced to concepts that will enable them to ultimately produce a viable and defensible research plan/proposal in LMP 2001H, and the need to obtain appropriate research ethics board approval in LMP2003. Consideration of statistical testing and how it impacts experimental design will be conveyed in LMP 2004. The student will apply this knowledge in developing their own research plan in LMP2005. For PA students this will include a clear understanding of the role and importance of the biobank in research. The ability to critically assess existing and emerging technologies and apply them appropriately is an important element in the expectations of a clinical laboratory specialist. All students are introduced to research evaluation in LMP 2001H. PA will apply this in LMP 2203H and CE will be exposed to technologies relevant to embryology in the Foundations in ART course (LMP 2102H) with a more critical view taken in LMP 2104H and LMP 2105H. In LMP 2107H, students will learn to apply this knowledge to making clinical care decisions/recommendations. The capstone project will also entail the appropriate application of experimental or clinical technology for both PA and CE students. The expectation is that the student's level of expertise in this application will advance as the capstone project progresses.
3. 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.	Application of Knowledge is defined in Laboratory Health Sciences as the use of anatomic pathology and clinical embryology information and principles to guide work performance decisions. Core outcomes: • Know when and how to use statistical tests • Apply quality assurance processes in the clinical lab	The program design and requirements that ensure these student outcomes for application of knowledge are: Core-specific program design: An understanding of fundamental statistical principles is important for the critical evaluation of the literature and clinical purposes. Quality assurance is an integral part of any clinical lab. The students are introduced to quality assurance practices in the clinical lab

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
	• Recommend and justify the need for follow-up evaluation and/or procedures based on initial findings and clinical context PA outcomes: • Interpret clinical pathology results with an understanding of the inherent strengths and limitations of an individual procedure • Use patient medical and hospital records to guide clinical work CE outcomes: • Assess oocytes, sperm, and embryos • Perform laboratory techniques used in ART	and their importance in core course LMP 2002H. These overall principles will be expanded upon in field-specific courses as specific aspects diverge between the pathology and embryology laboratory. For CE students, these discipline-specific practices are presented in LMP 2102H with further in-depth information presented in LMP 2104H, and in LMP 2107H, in a coordinated fashion. The CE students will gain practical skills by performing standard quality assurance testing as part of their CE simulation lab training (LMP 2108H and 2109H), where they will become proficient in monitoring key quality procedure parameters. Finally, as part of their clinical lab rotation (LMP 2110H), CE students will observe and participate in quality assurance procedural monitoring in an active operational clinical embryology laboratory. For PA students, this will also include standards for autopsy dissection and forensic examination which will be covered in LMP 2206H and LMP 220Hh. Decision making in ART is the shared purview of the two care providers: embryologist and physician. The CE student will be introduced to important concepts that form the knowledge base to meet this challenge throughout their training. How this is applied will be introduced in LMP 2102 (Foundations in ART) and LMP 2104 (Applied Methods in ART). This learning objective will be strengthened and evaluated in LMP 2107. Ultimately, these decisions are the responsibility of the attending physician, so an intermediary level of competence is the expectation of the program of the human component of the decision making compared to the cell component. In the practicum series the PA student will be taught to search for and identify areas for follow-up evaluation. This skill will build as the practicum progresses and will focus on specific organ systems. *PA-specific program design:* This learning objective addresses a task that is essential to a PA's daily routine. Students will be exposed to the basic principles in gross dissection and interpretation in LMP 2200H and 2201H. How this varies with the

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
		assessment of specific tissue types and diseases will be addressed in the practicum series. This learning objective covers a skill that is essential for the PA student to acquire. The ability to critically read the patient's chart, using the clinical history and laboratory findings to guide the examination and submission of appropriate tissue specimens for microscopic examination, including any special procedures (e.g. molecular analysis). This skill will be developed in each practica as they relate to specific organ systems. As the practica series progresses, the student will become more adept at interpreting the charts and performing a clinical pathology correlation. *CE-specific program design:* The ability to assess gamete and embryo quality based on qualitative and quantitative histomorphic and behavioural (e.g. sperm motility) parameters is a fundamental task performed by all practicing clinical embryologists. CE students will be introduced to the concept of grading and the general principles of gamete and embryo assessment in LMP 2102H (Foundations in ART). The application of evaluation criteria will be discussed in detail in LMP 2104H (Applied Methods in ART) and applied in the CE simulation lab (LMP 2108H and LMP 2109H), where the student is expected to show proficiency and accuracy in these evaluations. The student will then observe and, in some cases, participate in the evaluation of gametes and/or embryos in the practicing clinical embryology lab as part of LMP 2110H. Within the CE simulation lab, we will provide students with directed practice in ART laboratory techniques. This will allow us to ensure the student develops a beginner level 'hands-on' technical skills in common procedures required by potential employers.
4. Professional Capacity/ Autonomy • The qualities and transferable skills necessary for	Professional Capacity/Autonomy is defined in Laboratory Health Sciences as the ability to apply the appropriate skills required for the interpretation and use of human	The program design and requirements that ensure these student outcomes for professional capacity/autonomy are: Core-specific program design:

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
employment requiring ○ The exercise of initiative and of personal responsibility and accountability; and ○ Decision-making in complex situations • The intellectual independence required for continuing professional development; • The ethical behavior consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and • The ability to appreciate the broader implications of applying knowledge to particular contexts.	genomic data in a laboratory setting. Core outcomes: • Know, and be able to apply ethical standards for clinical laboratory science • Know and follow the professional guidelines for communication of clinical findings • Appreciate the consequence of growing availability of cell and molecular biology information on clinical medicine CE outcomes: • Understand how the embryologist can provide patient centered care	Ethical practice and adherence is a basic tenet of professionals. Situation-specific aspects to laboratory medicine, pathology and fertility will be studied. PA: Several courses will deliver knowledge of standards including consents, scope of analysis, and use of tissue for research. CE students will study the legal framework within which the profession practices (Assisted Human Reproduction Act). The application and relevance are addressed in LMP 2104H, 2105H, and 2107H, in particular procedures and approaches. Communication of clinical findings, maintaining patient confidentiality and respect is a common element for both fields. Basic principles will be introduced in LMP 2003H as part of Biomedical Ethics course, including appropriate legal requirements. Clinical embryologists often must communicate with patients or other healthcare providers on sensitive information regarding genetic disorders. This field-specific aspect will be outlined as part of the Reproductive Genetics course, LMP 2103H, with situational testing on simulated case studies in that course as well as in. LMP 2107H, Applied ART Laboratory Decision making. Confidentiality of the situation and results for PAs becomes a concern for autopsy and forensic pathology and biobanking. Clinical laboratory specialists are encouraged to consider new technologies and advances in our understanding of disease and their treatment. The use of genetic information in clinical labs will increase in the foreseeable future. A fundamental understanding of cell and molecular biology, presented in LMP 2000H will provide the tools needed to appreciate what these changes entail. For CE students, these concepts will be expanded on as they apply to preimplantation genetic testing and screening (LMP 2103H) and decision-making (LMP 2107H). For PA students, emerging skills for tissue handling and processing for molecular genetic testing will be discussed within the practicum series. *CE-specific program design*:

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
		Cultural awareness; sensitivity to diversity; and appreciation of health inequity as related to infertility care in general and ART in particular are essential for the clinical embryologist. Legal and ethical requirement will be taught in Bioethics (LMP 2003H) with concepts relevant to ART discussed in Foundations in ART (LMP 2104) and Applied ART Laboratory Decision Making (LMP 2107)
5. Communications Skills The ability to communicate ideas, issues and conclusions clearly.	Communications Skills is defined in Laboratory Health Sciences as the ability to communicate anatomic pathology and clinical embryology information in a clear, easily understood fashion tailored to the level of understanding of the audience. This is reflected in students who are able to present critical reviews of appropriate scientific areas and clinical reports on applied topics as part of their clinical workload. Creating research reports on their capstone project, presenting orally and defending their research work. *Core outcomes*: • Create written and oral presentations on research topics and literature • Synthesize complex information in written and oral form to present to appropriate stakeholders	The program design and requirements provide the student opportunities to develop written and oral communication skills through class presentations and written assignments. These have been incorporated into all courses in the program. Students will develop and defend a research proposal relevant to their field as part of their capstone project. LMP 2005Y is a continuous course where students will learn how to give a strong presentation and how to write an effective proposal. These skills will be strengthened with feedback provided by preceptors and instructors, to culminate in a finished project. For CE students, written research summaries and presentation will be a fundamental component of LMP 2106H. Communication of knowledge translation will also be taught within the interactive Applied ART Laboratory Decision Making Course (LMP 2107H). Students will be asked to evaluate the work of their peers, further embedding the learning of these skills. Communication with peers within the embryology lab, between various team members within the ART clinic and with patients, is essential for the delivery of safe and appropriate patient care. Simplification of complex procedures and concepts to other ART team members and/or patients is often necessary. We will work towards this in multiple courses within the program. Simplification of complex genetic testing information will be discussed in LMP 2103H and increasingly complex laboratory procedures in LMP 2104H and LMP 2105H. Communication of complex information is a focus of the capstone project and by its completion, students should demonstrate a level of expertise in this skill. This will also be an important element of the evaluation

Master's DLEs (based on the Ontario Council of Academic Vice-Presidents [OCAV])	Master's Program Learning Objectives and Outcomes	How the Program Design and Requirements Supports the Attainment of Student Learning Outcomes Note: please see the curriculum map in Appendix F to support the explanation in this column.
		of the student by their preceptor during the clinical lab rotation. For PAs, communication with the full pathology team, including other PAs, supervising pathologists, and technicians will be introduced in LMP2002H and applied in the practicum series.

9 Assessment of Learning

- Appropriateness of the proposed methods for the assessment of student achievement of the intended program learning outcomes and degree-level expectations.
- Describe plans for documenting and demonstrating the level of performance of students consistent with the DLEs. (Assessment of Teaching and Learning examples in Guide to Quality Assurance Processes)

Assessment of Learning:

In this section, we will first summarize the main kinds of assessments to provide an overview. This will be followed a detailed breakdown in Table 4. The assessment of learning in this program uses evaluations of various teaching modalities employed in the program to show the level of performance of each student with respect to DLE's.

a) Students are evaluated on the knowledge taught in the didactic lectures through quizzes and exams, which is appropriate for the DLE and LO described. These will be administered in-class and will test application of the learned material and the degree of understanding through recall of key concepts and through applying the knowledge to written scenarios and problems.
b) Student presentations to peers and faculty will evaluate several aspects of student learning. These include their ability to critically review, and in some cases select, relevant literature; their ability to assemble material from multiple sources and place it in a logical progression, their ability to take complex information and extract key information, and their ability in oral communication and developing critical and defensible arguments. These skills are important for instilling a process for lifelong self-directed learning.
c) Student discussions on topics of the day are evaluated by course instructors based on engagement, knowledge and innovative thinking. This allows instructors to evaluate student comprehension of the material in an ongoing fashion, enabling them to provide additional explanation as might be required.
d) Student essay and reports are evaluated by instructors using a marking scheme that evaluates format, background knowledge, critical assessments and innovative conclusions. Similar to the preparation for class presentations, these activities enable instructors to assess the students' ability to select and evaluate relevant literature, their ability to assemble this material into an original, informative, and focused document, their ability to take complex information and extract key information, and their written communication skills. These skills are important for instilling a process for lifelong self-directed learning.
e) Practicums are assessed by quizzes, by competency checklists, by maintenance of student activity logs and by observations of tasks by faculty instructors. These tools are appropriate to assess practicum learning. They allow the instructor the ability to directly evaluate how well the students understand the material taught in the practicums and how well they are able to apply what they have learned and how they can problem solve based on their fundamental academic and clinical knowledge and skills. Technical skills are vital aspects for both PAs and CEs. For CEs, the

simulation lab and rotations will provide them with basic skills that they can then build upon in their employment as they develop expertise.

How the program will document and demonstrate the level of performance of students' consistent with the University's DLEs

The MHSc in Laboratory Medicine will establish a Curriculum and Oversight Committee which will consist of the Program Coordinator, Field Directors, key faculty and at least one practicum site leaders. Please refer to Appendix E for the Program Organizational Chart. Its purpose will be to review student grades and student evaluation of courses to assess whether the program is meeting its objectives. This committee will meet at least twice a year to discuss the curriculum, specifically how to identify and address gaps in the curriculum, review the assessments of practicum placements, and identify program strengths and areas for improvement.

The program has been designed to allow for flexibility in curriculum design to incorporate new knowledge in pathology and advanced reproductive technology/infertility. This structured evaluation and course-planning approach will ensure that students are being provided with effective and relevant content.
The following metrics to measure the success of the program will be implemented:

1) Course Evaluations
All students will be provided with an anonymous course evaluation form to complete at the end of the course. Their responses to this will help guide subsequent revisions to the program.
2) Review of Grades and Quality of Assignments
This committee will meet two times a year to assess whether the learning outcomes of the courses delivered have been achieved by reviewing grades and the quality of assignments
3) Tracking Careers of Graduates
Once students have graduated from the program their subsequent job placements will be monitored.

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
L-01	Depth and Breadth of Knowledge	Understand the fundamental cell and molecular biology principles of pathology and reproductive technology used in the clinical laboratory.	x			Students will be assessed through examinations that will determine the extent of their knowledge in all listed courses.	Students will be assessed based on the quality of review summaries in LMP 2100H, 2101H, 2103H, and 2200H. Students will also submit written reports of their presentation topics in LMP 2000H, 2106H and 2201H.	Students will be assessed on the quality and content of their in class presentations and discussions in LMP 2000H, 2102H, 2106H, and 2201H.	
L-02	Depth and Breadth of Knowledge	Identify gaps in knowledge that lead to research and clinical investigations	x			Students will be evaluated through examinations and quizzes [LMP 2001H, 2102H, 2103H, and 2106H].	All students will be assessed through written assignments in LMP 2001 and on the rationale and significance of the self-selected topic of their capstone research project [in consultation with their capstone supervisor] in LMP 2005Y. CE students will be assessed on written critical assessments of literature on laboratory approaches in clinical embryology in LMP 2105H and LMP 2106H.		
L-03	Depth and Breadth of Knowledge	Understanding the principles of laboratory quality assurance	x			Students will be evaluated based upon their understanding of topics related to laboratory management and quality assurance through set quizzes and examinations in LMP 2002H. CE students will be assessed by quizzes	PA students will be assessed for their knowledge of quality assurance compliance by viewing video case studies and providing a written analysis in their practicum series. CE students will be assessed based upon written reports of oral presentations in LMP 2104H and 2105H.	Students will be evaluated on their presentation and discussions in LMP 2104H and 2105H (for CE students) and in their practicum series courses (PA students)	

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
						and exams in LMP 2104H and 2105H.			
L-04	Depth and Breadth of Knowledge	Identify and list the etiology and pathogenesis of human diseases		x		Students will be assessed by quizzes and examinations.		Students will be evaluated on their presentations and discussions in LMP 2000H, 2200H, and 2201H	
L-05	Depth and Breadth of Knowledge	Recognize tissue specimen variation and decide which laboratory approaches are best suited to each type of variation		x		Students will be assessed by quizzes within each course of the PA practicum series.		Students will be evaluated based on their presentation and discussions in their practicum series courses.	Students will be assessed based upon a competency checklist in the practicum series
L-06	Depth and Breadth of Knowledge	Understand reproductive physiology and the underlying pathophysiology leading to common causes of infertility			x	Students will be assessed by in-class quizzes and examinations (LMP 2100H, LMP 2101H and LMP 2103H).	Students will be assessed based on written assignments (LMP 2103H), on written summaries of topics presented by other students and an in-depth written summary of their oral presentation topics (LMP 2100H, LMP 2102H and LMP 2106).	Students will be evaluated based on their oral presentations and participation in class discussions (LMP 2100H; LMP2101H, LMP2202H, LMP2103H, and LMP2106H)	

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
L-07	Depth and Breadth of Knowledge	Know current ART procedures, their indications, strengths, and limitations			x	Students will be assessed by in-class quizzes and examinations (LMP 2100H, LMP 2102H, LMP 2104H and LMP 2103H).	Students will be assessed based on written assignments and a written review paper (LMP 2107H), on written summaries of topics presented by other students and an in-depth written summary of their oral presentation topics (LMP 2100H, LMP 2102H, LMP 2104H and LMP 2105H)	Students will be evaluated on their oral presentations and participation in class discussions (LMP 2100H, LMP2202H, LMP2104H, and LMP2105H)	
L-08	Research and Scholarship	Critically read and interpret research and clinical literature in the disciplines of pathology or ART	x			Students will be assessed by in-class quizzes and examinations (LMP 2000H, LMP 2001H, LMP 2102H, LMP 2104H, LMP 2106H)	Students will be assessed based upon their written assessments of published literature (LMP 2000H, LMP 2001H), written assignments (LMP 2001H), written summaries of topics presented by other students and an in-depth written summary of their oral presentation topics (LMP 2102H, LMP 2104H and LMP 2105H) as well as weekly evaluations of class presentations (LMP 2106H). The students will also submit a	Students will be assessed based on the caliber of their critical analysis presented orally and within ensuing class discussions [all courses within this learning objective].	

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
							research proposal as part of their capstone project.		
L-09	Research and Scholarship	Understand the principles involved in developing a viable research proposal	x			Students will be assessed by quizzes and examinations (LMP 2001H, LMP 2102H, LMP 2203H)	Students will be assessed based upon in-class written assignments (LMP 2001H, LMP 2003H) and the quality of their written research proposal (LMP 2005Y)	Students will be evaluated on their oral presentations and participation in class discussions (LMP 2100H, LMP2202H, LMP2104H, and LMP2105H) and the oral defense of their capstone project.	
L-10	Research and Scholarship	Critically assess technologies for their appropriate use and effectiveness	x			Students will be assessed by quizzes and examinations [LMP 2001H, LMP 2102H, LMP 2107H].	Students will be assessed based on the content and quality on their written research proposal in LMP2005Y, and by in-class written assignments (LMP 2001H, 2101H, 2102H)	Students will be evaluated on their oral presentations and participation in class discussions (LMP 2100H, LMP2202H, LMP2104H, and LMP2105H) and the oral defense of their capstone project.	Students will be assessed based upon a competency checklist in LMP 2203H
L-11	Application of Knowledge	Know when and how to use statistical tests	x			Students will be assessed by quizzes and problem-based examinations	Students will be assessed based upon in-class written assignments in LMP 2004H		
L-12	Application of Knowledge	Apply quality assurance processes in the clinical lab	x			Students will be assessed by case-based quizzes			

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
						and examinations (LMP 2002H, 2102H, 2104H, 2107H,2108H, and 2109H)			Students will be assessed based upon an on-site clinical supervisor or preceptor evaluation in LMP 2202H, 2206H, 2207H, and 2110H.
L-13	Application of Knowledge	Recommend and justify the need for follow-up evaluation and/or procedures based on initial findings and clinical context	x			Students will be assessed by quizzes and examinations in LMP 2102H, 2104H (for CE students) and by quizzes in the PA practicum series.	Students will be assessed based upon problem-based learning assignments in LMP 2104H and 2107H (for CE students).	Students will be evaluated on their oral presentations and participation in class discussions (LMP 2107H)	PA students will be assessed based upon a competency checklist applied in each of the PA practicum series
L-14	Application of Knowledge	Interpret clinical pathology results with an understanding of the inherent strengths and limitations of an individual procedure		x		Students will be assessed by quizzes and examinations in LMP 2200H, 2201H, and in all PA practicum courses.			Students will be assessed based upon a competency checklist applied in each of the PA practicum series
L-15	Application of Knowledge	Use patient medical and hospital records to guide clinical work		x		Students will be evaluated through on-site quizzes performed within each course of the PA practicum series.	PA students will be assessed by viewing video case studies and providing a written analysis in all courses of the PA practicum series.		
L-16	Application of Knowledge	Be able to assess oocytes, sperm, and embryos			x	Students' knowledge in assessing gametes and embryos will be assessed			Student technical ability to assess gametes and embryos

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
						by quizzes and exams in the foundation courses, LMP 2102H and 2104H.			will be assessed in a competency checklist and in practical exams conducted in the CE simulation courses, LMP 2108 and 2109. Students will also be assessed by preceptors during the clinical lab rotations (LMP 2110).
L-17	Application of Knowledge	Perform laboratory techniques used in ART			x				Students will be examined in 4 practical examinations in each of the CE simulation courses and will be evaluated for participation. Practical examinations will consist of both a written and performance component.
L-18	Professional Capacity/ Autonomy	Know, and be able to apply ethical standards for clinical laboratory science	x			Students will be assessed by examinations (LMP 2003H, 2104H, and 2107H) and in-class quizzes (LMP 2206H, 2207H, and 2208H).	Students will submit written assignments in LMP 2003H, 2104H, 2105H, and 2107H.		Students in LMP 2206H, 2207H, and 2208H will be tested using a competency checklist.
L-19	Professional Capacity/	Know and follow the professional guidelines for	x			Students will be assessed by examinations (LMP	CE students will be assessed through written report		PA students will be evaluated through

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
	Autonomy	communication of clinical findings				2003H, 2103H, 2107H), and within all courses in the PA practicum series.	submitted in LMP 2103H and 2107H.		situational testing by practicum supervisors for adherence and application of communication guidelines.
L-20	Professional Capacity/ Autonomy	Appreciate the consequence of growing availability of cell and molecular biology information on clinical medicine	x			Students will be assessed by quizzes and examinations in LMP 2000H, 2103H, and in all PA practicum courses.	Students will be assessed based on the quality of review summaries in LMP 2103H. Students will also submit written reports of their presentation topics in LMP 2000H.	Students will be assessed based on the caliber of their critical analysis presented orally and within ensuing class discussions [LMP 2000H].	
L-21	Professional Capacity/ Autonomy	Understand how the embryologist can provide patient centered care			x	Students will be assessed by quizzes and examinations in LMP 2103H, 2104H and 2107H.	Students will be assessed based on the quality of written assignments in LMP 2003H. Student will also submit written reports of their presentation topics in LMP 2104H and 2107H.	Students will be assessed based on the caliber of their critical analysis presented orally and within ensuing class discussions (LMP 2104H and 2107H).	
L-22	Com. Skills	Create written and oral presentations on research topics and literature	x				Students will be assessed based on the content and quality on their written research proposal in LMP2005Y, and by in-class written assignments (LMP 2106H and 2107H)	Students will be evaluated based upon their communication skill exhibited during the oral defense of their capstone project (LMP 2005Y) and in literature reviews and summaries presented	

Table 4. Assessment of Program Learning Outcomes & Degree Level Expectations

	Type of Learning Objective	Program Learning Outcomes	BOTH	PA	CE	Type of Assessment			
						Quizzes and Exams	Written reports	Oral presentations	Practical examinations
								in LMP 2106H and 2107H.	
L-23	Com. Skills	Synthesize complex information in written and oral form to present to appropriate stakeholders	x				CE students will be assessed based on written assignments (LMP 2103H), on written summaries of topics presented by other students and an in-depth written summary of their oral presentation topics (LMP 2104H, LMP 2105H). PA students will submit written reports within each of the courses of the PA practicum series. Students will be assessed based on the content and quality on their written research proposal in LMP2005Y.	Students will be assessed on the quality and content of their in class presentations and discussions in LMP 2103H, 2104H, and 2205H. Students will be evaluated based upon their communication skill exhibited during the oral defense of their capstone project (LMP 2005Y)	

10 Program Description & Calendar Copy

- Provide a description of the program (audiences: prospective and current students, staff, and employers) that can be used for external and internal posting that includes the following information:
  - Program's purpose (who is it for, what are the outcomes)
  - Nature of learning environment (including mode of delivery)
  - Approaches to teaching/learning/assessment
- Provide, as an appendix, a clear and full calendar copy including:
  - The program description; the program requirements including all required courses and recommended electives and their prerequisites, including for any fields/concentrations.
- Provide as an appendix:
  - A full list of the all courses included in the program including course numbers, titles, and descriptions.
    - Please indicate clearly whether they are new/existing. (Please note that all new courses should be proposed and approved independently in line with established academic change procedures. Where possible, append full course proposals as an appendix).

The Master of Health Science in Laboratory Medicine is a full-time two-year professional master's degree program offered by the Department of Laboratory Medicine and Pathobiology assisted by Obstetrics and Gynecology, Faculty of Medicine. It consists of 9.5 full course equivalents, including a capstone practicum in the last sessions of the degree program. The program will be offered on a full-time basis. The length of the program is two years (6 terms, starting in Fall) which includes the core and field-specific courses and practica.

There are two fields in Laboratory Medicine to choose from, Pathologists' Assistant (PA) and Clinical Embryology (CE). Pathologists' Assistants (PAs) are involved in providing diagnostic services in anatomical pathology through applying knowledge of tissue and laboratory analysis of human specimens. Clinical Embryologists (CEs) provide clinical management related to assisted reproductive technology in clinical embryology laboratories.

The professional MHSc is the best way to respond to education gaps in basic science, applied technology and core laboratory functions in both fields as advances are outpacing the ability to incorporate them into the current non-university, non-academic apprenticeship models of training PAs and CEs.

This new professional degree program will provide both laboratory and clinical-focussed students with the theory and practical knowledge necessary to function as PAs or CEs. The current independent apprenticeship education is no longer adequate to train PAs and CEs and is being abandoned and redeveloped into a professional graduate MHSc.
Potential applicants will be graduates from life science and biomedical programs. The curriculum will consist of lecture, discussion, presentations, practicums, and project-based courses across 6 sessions, with the intent to teach a core foundation of basic sciences,

followed by field based academic and applied training to function as a clinical scientist. There will also be a capstone project focussing on the development and demonstration of research skills.

Please see Appendix A for a full list of the course numbers and titles, indicating clearly whether they are new/existing.

Please see Appendix B for proposed calendar copy.

11 Consultation

- Describe the expected impact of what is being proposed on the nature and quality of other programs delivered by the unit/division.
- Describe the expected impact of what is being proposed on programs being offered by other units/divisions.
- Describe any consultation with the Deans of Faculties/divisions that will be implicated or affected by the creation of the proposed program as per UTQAP 2.4.2 "The Dean ensures that appropriate consultation is conducted with faculty and students, other university divisions and external institutions."

- There is no expected impact of this program on other programs presented by LMP as these programs for doctoral and [academic content] focused. The professional master's will not likely draw students from other graduate programs

- The administrators of the Surgical Skills Lab at Mount Sinai Hospital have been consulted for advice on simulation laboratory operations. Heather Shapiro, faculty in this program is participating in the University of Toronto, Faculty of Medicine external review (2018) of simulation education in the faculty

- The Canadian Fertility and Andrology Society has been consulted and has provided a letter of support (Appendix H)

- The Canadian Chairs of Pathology and Laboratory Medicine have been consulted and support the creation of the Professional MHSc in Laboratory Medicine

- The Canadian Association of Pathologists (CAP) and its associated PA section, Canadian Certification Council of Pathologists' Assistants, are supportive of our program and offered to provide any assistance. CAP includes academic and community pathologists and promotes both the academic and clinical mission of pathologists in Canada.

- The departments of Pathology of the five medical schools in Ontario have been consulted

- Faculty teaching bioethics at the Dalla Lana of Public Health have been consulted

- Cognate departments such as Medicine, Surgery and Institute of Medical Sciences have been consulted.

- The proposal was presented to the Council of Health Deans on January 9, 2019

- The undergraduate Vice-Deans at the University of Toronto from the Faculty of Arts and Sciences, UTSC and UTM have been provided with a copy of the proposal.

12 Resources

12.1 Faculty

- Complete Table 3 below
- Brief commentary to provide:
  - Evidence of the participation of a sufficient number and quality of faculty who will actively participate in the delivery of (teach and/or supervise) the program
  - Evidence of and planning for adequate numbers and quality of faculty and staff to achieve the goals of the program
  - That faculty have the recent research or professional/clinical expertise needed to sustain the program, promote innovation and foster an appropriate intellectual climate
  - of how supervisory loads will be distributed, and the qualifications and appointment status of faculty who will provide instruction and supervision
  - Planned/anticipated class sizes (connect this to delivery method, Section 8 and assessment methods, Section 9)
  - If relevant, plans and commitment to provide additional faculty resources to support the program.
  - The role of any adjunct or contractual (e.g., stipendiary) faculty.
- Provide the CVs of all faculty who appear in Table 3, as evidence substantiating the above. The appendix should form a separate document with a table of contents and all CVs in alphabetical order. CVs should be submitted in a consistent format

There is sufficient faculty in LMP and OB/GYN who have committed themselves to actively participate in the delivery of the courses, practicums and research projects in the program. The organizational structure of the program is described in Appendix E. Table 5 notes the responsibility of each faculty. Appendix A identifies course directors for the courses.

Each course will have a course director. The faculty with specific expertise will prepare and deliver each session (lecture), lead discussions and assess student presentations, participate in student discussions, and evaluate quizzes, exams, oral and written reports. By Fall 2020, all faculty listed in Table 5 will have associate or full appointments to the School of Graduate Studies. All instructors will be assessed by course directors and students through formal course evaluations annually to ensure the quality of teaching is maintained meets the highest standards.

These assessments will be reviewed by the Curriculum and Oversight Committee. It will have access to all course evaluations and student assessments, such as final marks, student

performance and engagement and performance on quizzes, exams, written reports, practicum assessments. It will monitor the program to ensure a sufficient and appropriate faculty to student ratio and that the progression of teaching and learning remains appropriate.

As a professional graduate program in the Faculty of Medicine, the program faculty includes tenured, clinical and status-only faculty. Some faculty will be appointed as adjunct faculty to provide expertise in teaching techniques for simulation and skills laboratory courses and the PA practicums and will be overseen by the field directors. The tenured and clinical faculty will provide leadership in the program and will provide most of the basic science teaching for PAs and CEs. The clinical faculty are experienced teachers in the clinical sphere and have the motivation, interest, and expertise to train PAs and CEs. LMP has considerable experience in clinical and status-only faculty with a large clinical faculty who have School of Graduate Studies' memberships and participate as research supervisors, members of student advisory committees, course instructors and lecturers in our graduate programs. LMP has a large successful doctoral stream program and an undergraduate Specialist Program that rely on teaching by clinical and status-only faculty.

The practicums for PAs will be taught by clinical faculty at the Ontario Forensic Pathology Service and at the teaching hospitals. These hospitals are Sinai Health System (formally Mount Sinai Hospital), St. Michael's Hospital – Unity Health Toronto, University Health Network and SickKids (formally the Hospital for Sick Children), Michael Garron Hospital - Toronto East Health Network (formally known as Toronto East General), Sunnybrook Health Sciences Centre and Credit Valley Hospital - Trillium Health Partners. In addition, the practicum for Forensic Pathology takes place at the Coroner's Office where we already train our fellows in the Royal College Program in Forensic Pathology. The faculty there have proven to be excellent teachers over several years and they are eager to provide training to our PA graduate students.

Table 5 Faculty Complement (please list alphabetically)

Name (Field)	**Unit of Primary Budgetary Appt & % of dept appointment pending**	**University Rank**	**Graduate Faculty Membership** (e.g. Associate/Full privledges) *appointment pending for Associate, restricted membership	**Commitment to other programs** (please list other program in which the person routinely teaches/supervises)	**Nature of contribution to this program** (Field director [FD], program coordinator [PC], course coordinator [CC], course instructor [CI], capstone instructor [CapI], clinical or practice supervisor [C/PS])
Tenure Stream:					
Michelle Bendeck (PA)	LMP	Professor	Full	MSc & PhD LMP; Undergraduate LMP	CI
Brian Cox (CE)	Physiology	Associate	Full	MSc & PhD Physiology; OB/GYN	CI
Harry Elsholtz (PA)	LMP	Associate	Full	MSc & PhD LMP; Undergraduate LMP	CI
Avrum I. Gotlieb (PA, CE)	LMP	Professor	Full	MSc & PhD LMP; Undergraduate LMP Dentistry	CI, PC, CC
David Irwin (PA, CE)	LMP	Professor	Full	MSc & PhD LMP; Undergraduate	CI, CC
Jennifer Mitchell (CE)	CSB	Associate	Full	CSB	CI
Michal Jozef Opas (PA)	LMP	Professor	Full	Undergrad	CI
Teaching Stream:					
Danielle Bentley (CE)	Anatomy (TS)	Assistant	Associate	Anatomy	CI, CC
Others (please specify, i.e., adjunct (CA), teaching stream (TS) status only (SO), clinical faculty (CF), visiting or other as per U of T definitions):					
Rebecca Arthur (CE)	OB/GYN (CF)	Assistant	Associate*	PGME	CI
Kerry Bowman (CE,PA)	DCFM, IM (SO)	Assistant	Full	Bioethics	CI, CC
Theodore Brown (CE)	OB/GYN (SO)	Professor	Full	MSc & PhD Physiol; Undergrad Physiol; IMS; LMP	CI, CC
Jagdish Butany (PA)	LMP (CF)	Professor	Associate	PGME, Undergraduate LMP	CI
Isabella Caniggia (CE)	OB/GYN (SO)	Professor	Full	Physiol/IMS	CI

Dianne Chadwick (PA)	LMP (CF)	To be determined	Associate*	TBD	CC
Crystal Chan (CE)	OB/GYN (CF)	Assistant	Associate*	TBD	CI, CC
Pat Chronis-Brown (CE)	OB/GYN* (CA)	To be determined	Associate*	TBD	CI, C/PS
Myron Cybulsky (PA)	LMP (CF)	Professor	Full	Graduate LMP	CI
Hala Faragalla (PA)	LMP (CF)	Assistant	Associate*		CI, CC, C/PS
Ellen Greenblatt (CE)	OB/GYN (CF)	Professor	Associate*		CI, CC
G. Scot Hamilton (CE)	OB/GYN (CA)	Adjunct	Associate*		CI, CC, C/PS
Carlo Vincent Hojilla(PA)	LMP (CF)	Assistant	Associate*	PGME LMP	CI, CC, C/PS
Nadia Ismiil (PA)	LMP (CF)	Assistant	Associate*	PGME LMP	CI, CC, C/PS
Michael James (PA)	LMP (CF)	Assistant	Associate		
Keith Jarvi (CE)	Surgery (CF)	Professor	Full	Grad/IMS	CI
Claire Jones (CE)	OB/GYN (CF)	To be determined	Associate*		CI, CC
Andrea Jurisicova (CE)	OB/GYN (SO)	Associate	Full	Physiol	CI
Rita Kandel (PA)	LMP (CF)	Professor	Full	Graduate LMP	CI
John Kingdom (CE)	OB/GYN (CF)	Professor	Full	LMP, Physiol, IMS	CI
Elena Kolomietz (CE)	LMP (SO)	Associate	Associate*		CI, CC
Clifford Librach (CE)	OB/GYN (CF)	Professor	Full	Physiol, IMS	CI
Kimberly Ellen Liu (CE)	OB/GYN (CF)	Assistant	Associate*		CI
Svetlana Madjunkova (CE)	OB/GYN* (CA)	To be determined	Associate*		CI
James Meriano (CE)	OB/GYN* (CA)	To be determined	Associate*		CI
Adam Millar (CE)	Medicine (CF)	Assistant	Associate*		CI
Lorna Mirham (PA)	LMP* (CF)	To be determined	Associate*		CI
Sergey Moskovtsev (CE)	OB/GYN (SO)	To be determined	Associate*		CI
John Brendan Maurice Mullen (PA)	LMP (CF)	Associate	Associate*	PGME LMP	CI
Abdul Noor (CE)	LMP (SO)	Assistant	Associate*		CI
Michael Pickup (PA)	LMP(CF)	To be determined	Associate*	PGME LMP	CI, CC, C/PS
Simon Jonathan Raphael (PA)	LMP (CF)	Associate	Associate*	PGME LMP	CI, CC, C/PS
Ian Rogers (CE)	OB/GYN (SO)	Associate	Full	Physiol	CI
Heather Shapiro (CE, PA)	OB/GYN (CF)	Associate	Associate	Grad/Undergrad, Physiol; IHPME. Grad LMP	CI, FD, CC, CaPI
Sony Sierra (CE)	OB/GYN (CF)	Assistant	Associate*		CI
John Snelgrove (CE)	OB/GYN (CF)	To be determined	Associate*		CI
Douglas Mills Templeton (PA)	LMP (PA)	Professor	Full		CI
Alicia Ann Tone (CE)	OB/GYN* (CA)	To be determined	Associate*		CI

Ilan Weinreb (PA)	LMP (CF)	Assistant	Associate*		CI, CC, C/PS
Rosanna Weksburg (CE)	Mol Gen (CF)	Professor	Full	Molecular Genetics	CI
George Yousef (PA)	LMP (CF)	Professor	Full	Graduate	CI, FD, CC, CaPI
Rhonda Zwingerman (CE)	OB/GYN (CF)	To be determined	Associate*		CI

For clinical faculty (CF) the unit of budgetary appointment is the hospital that pays them and the academic unit in the Faculty of Medicine is the unit of appointment.

12.2 Learning Resources

- Evidence that there are adequate resources to sustain the quality of scholarship and research activities of undergraduate and graduate students, including library support

Please see the following appendices:

Appendix C: Library statement confirming the adequacy of library holdings and support for student learning

Appendix D: Standard statement concerning student support services

12.3 Financial Support for Graduate Students

- Where appropriate to the program, evidence that financial assistance for students will be sufficient to ensure adequate quality and numbers of students.

As is the usual practice for professional master's programs at the University of Toronto, students are not eligible for stipendiary support. Students will be eligible for scholarships, loans and line of credit which is typically available to Professional Master's degree-based graduate students.

12.4 Space/Infrastructure

- Evidence that there are adequate resources to sustain the quality of scholarship and research activities of undergraduate and graduate students, including information technology support and laboratory access; address any unique requirements including renovations to existing space, new space, equipment, etc.
- Note: The requirements for physical facilities should be identified by providing information on the change in the number of people to be accommodated by type (i.e., faculty, students, administrative staff, etc.) as well as information on changes in equipment and activities requiring accommodation. The division/Faculty should state whether it plans to bring forward proposals for additional space; the renovation of existing space; or whether the current space allocation to the academic program will accommodate the new initiative.

- Capstones and research projects may be done within LMP and OB/GYN research labs, in the FOM affiliated hospitals and Research Institutes or at other approved university affiliated sites.

- The existing administrative staff in LMP have the capacity to handle the additional students of this new program. The Program Coordinator, Dr. Avrum Gotlieb, will oversee the program as a whole and work with the Field Directors, Dr. Heather Shapiro (CE) and Dr. George Yousef (PA). Please refer to Appendix E for the Program Organizational Structure.

- **Space for a Simulation and Skills Laboratory** at the Medical Science Building has been identified on the 6th floor of the Medical Sciences Building, Rm. 6302. A renovation budget has been approved by the Dean, Faculty of Medicine and will be completed by September 2019. The purpose of the Laboratory is to establish an environment to provide appropriate equipment and resources to enable the training of basic and advanced laboratory skills for CEs, mimicking real life situations without having to compromise active clinical care while learning. This center will be used to provide exposure and hands-on experience, allowing the students to gain the technical and functional skills required to be a qualified clinical laboratory professional.

- Any deficits in the annual operating budget will be supported by LMP and OB/GYN (Appendix H). Donations for some equipment have been secured by the Office of Advancement. Since CE trainees will need to maintain technical competencies and learn new technologies, we plan once our program is established (within the first 3-4 years) to provide training in advanced ART laboratory skills to currently practicing clinical embryologists using the Simulation and Skills Laboratory as a continuing professional education site. This will not interfere with MHSc program.

12.5 Other Resource Implications

- For example,
  - Is a new graduate unit contemplated that would require a separate graduate chair appointed under the PAAA?
  - Are there interdivisional teaching implications?
  - Will the new program affect any existing agreements with other institutions, or require the creation of a new agreement to facilitate the new program (e.g., Memorandum of Understanding, Memorandum of Agreement, etc.). (Existing joint programs are offered with Centennial, Sheridan and Michener.)
- Please consult with the Provost's office (vp.academicprograms@utoronto.ca) early regarding any resource implications described in this section.

The practicums will take place in the Department of Pathology of the teaching hospitals that train our postgraduate medical residents and fellows and will not affect any existing agreements. The Chiefs of each of the Departments (Appendix H) at Sinai Health System, St.

Michael's Hospital – Unity Health Toronto, University Health Network, Sunnybrook Health Sciences Centre, SickKids, Michael Garron - Toronto East Health Network and Credit Valley Hospital - Trillium Health Partners have accepted the responsibility to provide space for the practicum activities at their institutions and provide faculty to teach.

13 Quality and Other Indicators

- Please describe the appropriateness of the faculty's collective expertise and how it contributes substantively to the proposed program. Define and use indicators to provide evidence of the quality of the faculty (e.g., qualifications, research, innovation and scholarly record)
- Please explain how the program structure and faculty research will ensure the intellectual quality of the student experience.
- Please describe any elements that enhance the program's diversity.

As elaborated in Section 3, Academic Rationale, the faculty have much experience and expertise in educating basic science and clinical trainees. They have supervised graduate students and trained medical students and residents in laboratory medicine and pathology, and in obstetrics and gynecology.

The intellectual quality of the student experience will be enhanced by seminars presented by invited speakers and local U of T faculty. This will broaden the students' perspectives and provide intellectual rigour to research and problem solving.

The students will have access to a large academic faculty to provide advice on research experiments including design and analysis of investigations. All students will have a student advisory committee for their capstone project to provide them the quality of expertise and mentorship necessary for a successful research experience.

Preparing for a career in clinical laboratory sciences and biomedical research is a daunting task which requires comprehensive and accurate information on what to expect, how to plan, how to avoid pitfalls and how to be resilient and enjoy the journey to success. Our faculty have experience in mentorship and supervision of student research projects which will guide the students in this complex world of health care and biomedical research. One of our faculty has published a practical guide to academic and non-academic career development in biomedical sciences and is available to guide a comprehensive mentorship program for the students. The objective is to provide students with a competitive advantage by presenting useful information, insights and tips to guide our students in career planning as they achieve milestones and competencies in their clinical science training.

Appendix A: Courses

MHSc in Laboratory Medicine

Core Courses:

Course Code	FCE	Course Title
LMP 2000H	0.5	Cell and Molecular Biology
LMP 2001H	0.5	Biomedical Research Methods
LMP 2002H	0.5	Clinical Laboratory Management
LMP 2003H	0.5	Biomedical Ethics
LMP 2004H	0.5	Biostatistics
LMP 2005Y	1.0	Capstone Project (continuous)
	0.5	Elective
Total Core Courses	**4.0**	

Clinical Embryology (CE) Courses:

Course Code	FCE	Course Title
LMP 2100H	0.5	Advanced Reproductive Physiology
LMP 2101H	0.5	Human Embryology
LMP 2102H	0.5	Foundations in ART
LMP 2103H	0.5	Reproductive Genetics
LMP 2104H	0.5	Applied Methods in ART
LMP 2105H	0.5	Innovations in ART
LMP 2106H	0.5	Current Topics in Causes and Treatment of Infertility
LMP 2107H	0.5	Applied ART Laboratory Decision Making
LMP 2108H	0.5	CE Lab Simulation I
LMP 2109H	0.5	CE Lab Simulation II
LMP 2110H	0.5	ART Lab Rotations
Total CE Courses	**5.5**	

Pathologists' Assistant (PA) Courses:

Course Code	FCE	Course Title
LMP 2200H	0.5	Basic Principles in Human Pathobiology and Pathophysiology
LMP 2201H	0.5	Anatomy and Pathology of Organ Systems
LMP 2202H	0.5	Practicum in Surgical Pathology I
LMP 2203H	0.5	Practicum in Surgical Pathology II
LMP 2204H	0.5	Practicum in Surgical Pathology III
LMP 2205H	0.5	Practicum in Surgical Pathology IV

LMP 2206H	0.5	Practicum in Autopsy Pathology
LMP 2207H	0.5	Practicum in Forensic Pathology
LMP 2208H	0.5	Biobanking for Research
LMP 2209H	0.5	Practicum in Surgical Pathology V
LMP 2210H	0.5	Practicum in Surgical Pathology VI
Total PA Courses	**5.5**	

Detailed Course Descriptions

With the exception of Biomedical Ethics (LMP 2003H) and Biostatistics (LMP 2004H), the courses listed below will be new. Currently, LMP is in consultation with DLSPH for the Biomedical Ethics course and the Institute of Medical Science for the Biostatistics course, with the potential of using existing courses in the corresponding graduate department. The content that currently appears under these course codes reflect what the MHSc in Laboratory Medicine wishes to cover. This proposal will be updated once these consultations are finalized.

LMP 2000H: Cell and Molecular Biology
Course Co-ordinator: David Irwin

Course Objectives

- Students will learn fundamental principles of cell and molecular biology
- Students will learn about areas in cell and molecular biology actively being investigated
- Students will learn about experimental approaches to ask questions in this field
- Students will learn to critically appraise the literature in this field

Description

This course is designed to fill gaps in the fundamental knowledge of cell and molecular biology for new students enrolled in the Master of Health Sciences in Laboratory Medicine and to provide a solid foundation for other courses in this program. Emphasis will be on fundamental principles that are relevant to PAs and CEs.

Format

The first lecture will introduce the course and students will be assigned papers for class discussions. Through 10 topic-specific lectures, students will be provided with fundamental knowledge in diverse areas of cell and molecular biology. Each topic will be briefly introduced through a one-hour lecture by faculty, which would then be followed by a student-led discussions on two current papers (30 minutes each) addressing questions being addressed in the field. Lectures will be augmented by assigning readings from the current literature and online resources.

Week	Topics
1	Introduction to Cell and Molecular Biology
2	Genetics
3	Epigenetics
4	Transcription and Translation

5	Proteins: Structures to Proteomics
6	Metabolism and Energy
7	Mid-term Exam
8	Cell Structure
9	Membrane Cell Surface
10	Cell Signaling
11	Cell Division and Differentiation
12	Cell Death
13	Final Exam

Evaluation

Attendance is mandatory for all lectures. Each student will be assigned research papers, which they will be responsible for leading the discussion on. They will also write a short critique of these papers and summarize the class discussion of them. The other students will be expected to have read the papers and be ready to add to the discussions. Fundamental knowledge will be assessed through mid-term and final written exams. Enrolment is expected to be 10 students, with 2 students assigned papers each week – thus with 10 weeks covering different topics each of the students will lead the discussion of 2 papers.

Assessment

- 20% for presentations of (2) papers where they lead the discussion
- 10% for written assessment of the (2) presented papers and the discussion of them
- 10% for participation in the discussion of other (18) presented papers
- 30% midterm exam
- 30% final exam

LMP 2001H: Biomedical Research Methods
Course Co-ordinators: Heather Shapiro & Theodore Brown

Course Objectives

- Students will learn the types of research methodologies and when to use them.
- Students will learn to critically appraise the literature in their field.
- Students will be able to write a research proposal

Description:

Week	**Topics**
1	Types of Research Studies
2	Searching the Literature
3	Analysing the Literature
4	Translational Research
5	Seminar/ Worksheet
6	Asking a Question: Pop'n
7	Picking an Intervention
8	Determining Outcome
9	Biostatistics 1

10	Writing a Proposal
11	IRB
12	Science Research and Society

Evaluation
There will be three in class written assignments (70% total) and two quizzes (30% total).

LMP 2002H: Clinical Laboratory Management
Course Co-ordinator: George Yousef/ Scott Hamilton

Course Objectives

- The students will learn details of processes required for management of a clinical laboratory. The students will learn how to assess outcomes of laboratory management.
- The students will learn essentials of laboratory safety in clinical laboratories.

Description:

Week	Topics
1	Equipment
2	Maintenance
3	Certification Levels
4	Ergonomics
5	Safety Reporting
6	HCP Safety
7	Infection Control
8	KPIs
9	How to Write SOP
10	Auditing Processes
11	Building a Lab – Materials and VOCs
12	Understanding Acronyms GMP VOC HEPA
13	PHIPa/Privacy

Evaluation: TBD

LMP2003H: Biomedical Ethics
Course Co-ordinators: Heather Shapiro/Kerry Bowman

Course Objectives
The students will learn the description, assessment implementations of bioethics in a clinical laboratory. The students will learn bioethical considerations in the practice of PA and CE.

Description
This course may be offered through the Joint Centre for Bioethics (DLSPH).

Topics will include

- informed consent futility
- stem cell ethics, end of life
- reporting ethics
- tissue ownership
- communication skills
- Reproduction issues
- resource allocation
- ethical consideration of human research
- IRB/REB
- Clinical Trials/COI
- problem solving /decision making framework

LMP 2004H: Biostatistics
Course Co-ordinator: Heather Shapiro

Course Objectives:

- To develop basic statistical analysis skills used in health care research.
- To be able to critically appraise basic statistical analysis used in health care research.
- To acquire practice in communicating those skills through presenting the results of statistical analysis and interpreting them both orally and in written work.

Description
Consulting with Institute of Medical Science create or utilize existing course in this department.

LMP 2005Y: Capstone Project
Course Co-ordinator: Heather Shapiro and George Yousef

Course Objectives

- To train students to identify research problems and design a project to investigate the problem.
- To learn how to manage a research project and learn problem solving skills in biomedical science research.
- To learn to write a scholarly scientific report and to develop oral communication skills in research.

Description
A 1.0 FCE course extending over three terms to provide PAs and CEs an opportunity to explore a specific gap in knowledge and design a research proposal that investigates the topic. Topics are selected with the assistance of the field directors and the students are then matched to appropriate faculty. Each project has a student advisory committee that meets regularly with the student to provide guidance and assistance. The students will receive guidance from their

supervisor who will monitor their progress and ensure that milestones are met. The outcome is an oral presentation of their work and a written report.

LMP 2100H: Advanced Reproductive Physiology
Course Co-ordinator: Theodore Brown

Course Objectives

- To expose students to the developmental and functional aspects of the male and female reproductive systems
- To provide students with a strong applied understanding of the hormonal communication fundamental to the regulation of the hypothalamic-pituitary-gonadal axis
- To provide students with an understanding of the male and female reproductive systems that can form the basis for further understanding of infertility and its treatment.

Description
This is a foundational course that will provide the key content required for an embryologist and focused on development and regulation of the reproductive system.

Week	Topic
1	Course Introduction and review of the hypothalamic-pituitary-gonadal axis
2	Steroid hormone biosynthesis, metabolism, and mechanism of action as control points in the regulation of steroid hormone activity
3	Sex determination and sexual differentiation
4	Spermatogenesis
5	Hormonal regulation of male reproductive function
6	**Term test**
7	The female reproductive system: the ovarian cycle, intraovarian regulatory mechanisms; follicle development and ovulation
8	Hormonal regulation of the female reproductive cycle
9	Regulation of GnRH
10	Oocyte development and fertilization
11	Early embryo development and stem cell allocation
12	Infertility and an overview of assisted reproductive technology

Evaluation
The course mark will be based upon two exams, one covering the first 5 lectures and a final exam covering the remainder of the course, and an in-depth 10-15 page review of specific topic related to ART, upon consultation with the course director. Both exams consist of essay-type questions. In the first exam, students are asked to answer 3 questions. In the final exam, students answer 5 questions. Each question is designed to take approximately 25 minutes to answer and involve application of principles learned during lectures. 35% of the final course

mark will be derived from the first exam, and 40% will be derived from the final exam. 25% of the mark is based upon the review paper.

LMP 2101H: Human Embryology
Division of Anatomy, Department of Surgery, University of Toronto
Course Coordinator: Dr. Danielle Bentley, PhD

Course Objectives
The course is organized as two weekly lectures. Activities will be provided to the students outside of class time to reinforce course concepts and aid in understanding.

Description
Human embryology from fertilization to the end of the fetal period. Current concepts in mammalian morphogenesis applied to the development of the various organ systems; etiologies and pathogenesis of some of the more common human congenital abnormalities.

Week	Topic
1	Language of Anatomy
2	Gametogenesis
3	Fertilization and the First Two Weeks
4	Weeks Three and Four of Development
5	Folding and Placentation
6	Infertility
7	Congenital Malformations
8	Development of the Cardiovascular System
9	Development of the Limbs
10	Development of the Back
11	Development of the Nervous System
12	Stem Cells
13	Development of the Urogenital System I
14	Development of the Face and Branchial Apparatus
15	Development of the Endocrine System

Assessments
Student assessment will be based on the following

Course Tests:
There will be three term tests throughout the course. Each term test has been weighted according to the number of lectures covered, with each lecture accounting for 4.5%.
Test three will also include cumulative content from throughout the entire course, with each lecture accounting for 0.5%. As such, Test One will contribute 36% towards the final course grade, Test Two will contribute 40.5% towards the final course grade, and Test Three will contribute 18.5% towards the final course grade.

All tests will be written during class time. Location of tests is to be determined.

In-class TopHat Participation: TopHat student response system will be used in lecture. Your TopHat participation will contribute 5% towards the final course grade.

LMP 2102H: Foundations in ART
Course Co-ordinator: Scott Hamilton

Course Objectives
At the completion of this course the student will be familiar with the seminal research that laid the foundation for ART; able to identify knowledge gaps in ART science; able to analyse research and communicate this to an audience

Description

Week	Topics
1	The History of IVF
2	What is a good egg?
3	Semen Analysis vs Sperm Function
4	What makes an embryo stick? Part I
5	What makes an embryo stick? Part II
6	What do fertility drugs do to egg quality?
7	What does culture do to embryo quality?
8	The role of the incubator in embryo development
9	Presentation skills overview/outline
10	Presentations 1 and 2 and 3
11	Presentations 4 and 5 and 6
12	Presentations 7 and 8 and 9

Evaluation
This is a seminar based graduate only course. The first half of the course will be seminars led by leaders in the field. Each student will be responsible for summarizing one seminar and providing notes for the other students. These notes will be marked for content and clarity. The notes will include “unanswered questions” or topics for further conversation. Each student will then prepare a seminar in the second half of the course that will address these questions.

Assessments

Participation	10%
Summary Notes of Speaker (2 pages)	25%
Presentation	40%
Written Summary of Presentation	25%

LMP 2103H: Reproductive Genetics
Course Co-ordinator: Elena Kolomietz

Course Objectives
At the completion of this course, the student will know the human genome structure and function; know the mechanisms of inheritances of genetic conditions; can apply the principles of genetic testing to IVF treatment; be familiar with potential treatments for genetic diseases

Description

Week	Topic
1	Basic Genetics and Cytogenetics
2	Human Genome Structure and Function
3	Meiosis and Aneuploidy
4	Single gene defects
5	How to analyse a gene part 1
6	How to analyse a gene part2
7	Epigenetics and Imprinting Disorders
8	Genetic Testing in Infertility
9	ART as a treatment for genetic conditions
10	Preconception Carrier Screening –Practical and Ethical Considerations
11	Germline Genome Editing- Practical and Ethical Considerations
12	The nucleus and the mitochondria

Evaluation
- Class Participation 10%
- Midterm Test 15%
- Assignments, 2 at 25% each
- Final Exam 25%

LMP 2104H: Applied Methods in ART
Course Co-ordinator: Scot Hamilton

Course Objectives
This is a "preparatory" course, for the Simulation Lab courses, and the Innovations in ART course. It will provide the cognitive background required for technical skills learned in the simulation lab and it will act as a foundational course on which the Innovations course will build. This course will meld the theoretical and practical aspects of ART

Description
This course will be broadly divided into two areas: physiology and engineering. At the completion of the course, the student will understand the origins and the rationale for the use of common techniques

Week	Topics
1	Andrology Media
2	Sperm Function vs Sperm Tests
3	Why we need ICSI
4	Surgically Retrieved Sperm
5	Infections and Contaminations in the Lab
6	The Cell Membrane: implications in ART micromanipulation
7	The Cell Membrane: implications in ART Cryopreservation
8	The Cell Membrane: implications in ART – implantation
9	Pipettes and Catheters
10	Cell Fixation
11	Anything I can do, AI can do better

LMP 2105H: Innovation in ART
Course Co-ordinator: Crystal Chan

Course Objectives
At the completion of the course, the student will be familiar with the current controversies in ART; able to identify challenges in performing ART research; able to analyse current publications, and communicate this to an audience

Week	Topic
1	The Future of IVF
2	IVF and 'omics
3	Epigenetics and IVF
4	Mitochondria and IVF
5	Assisted Hatching
6	How to improve PGT
7	IVF and the Next Generation
8	Critical Appraisal Review
9	Presentation skills overview/outline
10	Presentations 1 and 2 and 3
11	Presentations 4 and 5 and 6
12	Presentations 7 and 8 and 9

Evaluation
This is a seminar based graduate only course. The first half of the course will be seminars led by leaders in the field. Each student will be responsible for summarizing one seminar and providing notes for the other students. These notes will be marked for content and clarity. The notes will include "unanswered questions" or topics for further conversation. Each student will then prepare a seminar in the second half of the course that will address these questions.

Assessments
Participation 10%

Summary Notes of Speaker (2 pages)	25%
Presentation	40%
Written Summary of Presentation	25%

LMP 2106H: Current Topics in Causes and Treatment of Infertility
Course Coordinator: Ellen Greenblatt

Course Objectives
To expose students to emerging concepts in reproduction and ART; To convey to students how to critically evaluate research articles; To instill a process for life-long learning in students by having them search the literature and select articles for discussion.

Description
This 0.5 FCE graduate student-only seminar-style course open to students in the CE stream will provide participants with an in-depth knowledge of physiology related to major clinically-relevant pathologies and topics in the cause and treatment of infertility. The course will consist of discussion of emerging topics in the causes and treatment of infertility. A key focus of the course will be the critical evaluation of current literature around the listed subject areas. The course will consist of 12 two-hour meetings, which will include student presentations and discussion of recent impactful research articles, with oversight provided by the faculty leader of each session.

Week	Topic
1	Overview of infertility and its causes
2	Physiology of Male Factor Infertility
3	Sperm function and semen analysis
4	Hormonal influences in infertility
5	Endometriosis
6	Over Response: Polycystic Ovarian Syndrome
7	Under Response : Ovarian Insufficiency
8	Germ cell generation from somatic cells
9	IVF – The Pharmacology of Oogenesis
10	The Macro Environment and Embryogenesis
11	The Micro Environment and Embryogenesis
12	Recurrent Implantation Failure

Evaluation
Each student will be asked to select an appropriate recent research paper on the subject area for each session. These will be approved (or may be assigned) by the session leader. Students will provide a 15-minute presentation of the research paper and will provide a written evaluation of the strengths and limitations of the work.

Weekly presentations	40%
Weekly evaluations	35%
Weekly Quizzes	15%
Participation	10%

LMP 2107H: Applied ART Laboratory Decision Making
Course Co-ordinator: Heather Shapiro

Course Objectives

- To present critical concepts relevant to operating an efficient ART Laboratory
- To present issues to consider when contemplating safe staffing levels
- To present the process for selecting, testing, and implementing new devices or technologies into the ART laboratory.

Description

Workplace Decision Making: Applying Bioethics, Management and Critical Appraisal in the Lab. The course will serve to integrate concepts taught in Bioethics and Critical appraisal along with management to develop decision making skills

Assignments:

1) Identify a new technology or equipment.
2) Review the current standards in this domain.
3) Metrics to consider: effectiveness, capital costs/operational costs, human resource needs, relative importance of the problem compared to the lab operation as a whole.
4) Complete a literature review on the scientific merits or claims of the device.
5) Prepare a presentation to the business office as to why this should be incorporated into the lab.

Week	Topic
1	Introduction; assignment of groups
2	Critical Appraisal Review: asking the question PICO
3	Assignment of groups/ brainstorming ideas
4	How to do a literature search
5	Research in Progress- presentation of topic choice
6	Introduction to Cost Effectiveness
7	What does a scientist need to know about a business plan
8	Understanding work flow implications of proposal
9	mid term test
10	Presentation skills/lit review
11	Final product presentation
12	Final product presentation
13	Judge evaluation of presenter

Evaluation

Research in Progress Presentation – 10%
Midterm Test– 25%
Final Product Presentation – 35%
Presenter, Written Report – 25%

LMP 2108H: Clinical Embryology Laboratory Simulation I
LMP 2109H: Clinical Embryology Laboratory Simulation II
Course Co-ordinator: Theodore Brown and Scot Hamilton
Instructional staff will include Laboratory Directors and Managers from IVF clinics in the GTA

Course Objectives
To provide CE stream students with a practical overview of equipment within a clinical embryology laboratory.
To provide CE stream students with practical hands-on experience with fundamental and advanced gamete and embryo handling procedures, assessment techniques, fertilization and sperm injection, cryopreservation and storage, and workflow.

Description
The purpose of this course is to expose CE stream students to a simulated clinical embryology laboratory environment where they can safely learn and practice technical skills that will be essential to their clinical career. Instructors recruited from IVF andrology and embryology clinical laboratories within the greater Toronto area, who have extensive expertise in these specific techniques will provide hands on instruction. In addition to training, we will provide the opportunity for the student to practice techniques to gain a minimal level of proficiency, understanding that many of these skills take considerable time to develop true expertise.

Term 1 – CE Lab Sim I	**Topic**
Week 1	Biosafety Training
Week 2	Introduction to the lab
Week 3	Semen handling, analysis, and interpretation
Week 4	Semen analysis, and interpretation-II
Week 5	Sperm cryopreservation, storage, and inventory management
Week 6	Sperm selection for ICSI
Week 7	Practical Examination
Week 8	Oocyte retrieval, handling, and fertilization culture medium
Week 9	Fertilization and assessment
Week 10	Oocyte denuding and ICSI
Week 11	ICSI
Week 12	Practical Examination
Term 2 – CE Lab Sim II	
Week 1	Embryo Assessment
Week 2	Embryo Transfer Preparation
Week 3	Trophectoderm biopsy
Week 4	Trophectoderm biopsy, handling for PGD/PGS analysis

Week 5	embryo freezing
Week 6	Oocyte cryopreservation
Week 7	Practical Examination
Week 8	Air quality in the IVF lab: VOCs monitoring
Week 9	Culture system control; temperature, pH, osmolality, Quality control and assurance procedures and adherence
Week 10	Laboratory Design and Construction
Week 11	Troubleshooting Lab Issues
Week 12	Practical Examination

Evaluation
Students will be assessed in practical examination held twice during each term and marked for participation during each of the sections. Practical examinations will consist of both a written component and a practical component where a student's understanding and performance of tasks covered in the prior weeks will be evaluated. Each of the 4 practical exams will be weighted equally (20% each). The remaining 10% will be assigned based on contribution during the sessions.

LMP 2110H: ART Laboratory Rotations
Course Directors: H. Shapiro and T. Brown

Course Objectives
To provide students with the opportunity to experience the workflow of an operating ART Laboratory

Description
Students will be placed in a partnering IVF laboratory and will function as a laboratory assistant for a period of 5 weeks. The student will be under the supervision of the laboratory director and/or a senior *embryologist* who will provide an assessment of the student's abilities. The student will observe and participate as appropriate in quality control measurements and verification, record keeping, stocking, semen processing, sperm manipulation and evaluation. Due to necessary restrictions, we do not expect students to handle oocytes or embryos; however, the student is expected to observe all procedures.

Evaluation
A rubric provided to the lab preceptor will provide guidance for the expectations of the student's activities during the rotation and for providing feedback to the course directors. Ten percent of the course mark will be based on this feedback, which will include attendance, punctuality, and professionalism. The student is also to submit a log of their activities to the course director (40%). The student will prepare a reflection of their experiences and present this to the group (25% for the written submission; 25% for presentation and discussion).

LMP 2200H: Basic Principles in Human Pathobiology and Pathophysiology
Course Co-ordinator: Avrum I. Gotlieb

Course Objectives

1. Students will describe the fundamental tissue and cellular processes that are present in common human disease conditions.
2. Students will understand and be able to discuss the cell and molecular regulation of these basic pathology processes.
3. Students will be able to describe and critique important research carried out to advance knowledge in these fundamental pathobiologic processes.

Description

This is a 0.5 FCE lecture/ seminar course with student presentations. Fundamental cellular and tissue processes will be presented in each lecture, most being common to many human diseases (to be explored in a subsequent course), that regulate normal human biology and pathobiology (often referred to as "General Pathobiology"). The material will focus on histopathology changes and the cell and molecular events that initiate and regulate these changes including genetic regulation; cell signalling pathways; cell-matrix interactions;

Week	Topics
1	Cell Adaptation, Injury and Toxicology
2	Cell Ischemia, Death and Aging
3	Acute and Chronic Inflammatory Processes
4	Immunological Processes: Innate and Acquired
5	Quiz I
6	Repair, Regeneration, Fibrosis and Remodelling
7	Thrombosis and Hemodynamic Processes
8	Basic Concepts in Neoplasia
9	Basic Conception Infection
10	Basic Concepts in Genetic Disease
11	Quiz II

Evaluation

Class discussions (10%) Student presentations (20%)
Quizzes (2) – conceptual and knowledge evaluation (15% - 2)
Final Essay, Review of a specific process in basic human pathology identifying importance of topic, background knowledge, gaps in current knowledge, general research approach to fill in the gaps through cell and molecular research. Essay is eight pages excluding references and figures and illustrations (40%).

LMP 2201H: Anatomy and Pathology of Organ Systems
Course Coordinator: Avrum I. Gotlieb

Course Objectives

1. Student will be able to describe gross and microscopic changes present in diseased organs.

2. Student will be able to understand and discuss the pathogenesis of organ and systemic disease.
3. Student be able to will describe and critique important research studies of diseased organs.

Description

This is a 0.5 FCE lecture/ seminar course with student presentations. The content focuses on the pathology and the cell and molecular alterations in organs that occur in specific human diseases. Student presentations will focus on pathogenesis through critique of critical journal articles. The course "Research Methods" provides fundamental knowledge to aid in assessing and evaluating research. Since many diseases are systemic in nature, the pathogenesis in both organs and systems will be addressed. The students will use the knowledge gained in "Basic Principles in Human Pathobiology and Pathophysiology" and in "Cell and Molecular Biology" as foundation knowledge for this course.

Week	Topics
1	Atherosclerosis
2	Heart Disease, Ischemic Heart Disease, Myocarditis, Cardiomyopathy
3	Respiratory Disease
4	Gastrointestinal Tract Disease
5	Quiz I
6	Liver, Biliary System, Pancreas Diseases
7	Kidney and Urinary Track Disease
8	Male and Female Reproductive Track Disease
9	Breast and Skin Disease
10	Bone, Joints and Soft Tissue Disease
11	Brain and Nervous System Diseases
12	Quiz II

Evaluation

Quiz I, II – Evaluation of Concepts and basic knowledge (15% - 2)
Student Presentations (15%, 2-per student)

This will be based upon an assessment of each of the student presentations and their active participation in the discussions surrounding the topics presented in class.
Final Essay, in-depth critical review paper (8 pages) on a relevant disease condition approved by course director. Essay should identify current knowledge gaps and general approaches to investigate these gaps (40%).

LMP 2202H: Practicum in Surgical Pathology - Part 1
Course Co-ordinator: Hala Faragalla/Nadia Ismiil

Course Objectives

- Develop understanding of the overall process of surgical pathology gross examination and dissection and the special precautions for certain circumstances
- Understand and be able to troubleshoot major issues related to surgical pathology

- Learn safety precautions needed for the pathology lab grossing station
- Quality assurance measures in surgical pathology labs

Description

This is a 0.5 FCE practical hands-on training course. Candidates will be rotating between St. Michael's Hospital and Sunnybrook Health Sciences Centre. Candidates will spend 2 full days a week (6 hours per day) at one of these two participating university hospitals. They will be shadowing certified PAs at a specimen dissection workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. This course includes an introduction to orientation, cutting, handling, macroscopic description and processing of surgical pathology specimens. It also includes reading assignments through manuals of surgical pathology grossing (e.g Lester's manual and Ackerman surgical pathology). Candidates will also learn safety precautions including universal precautions and other common background techniques that are needed for gross pathology assessment and safety.

Week	Topics
1	Specimen handling for pathologic evaluation
2	Specimen processing: From gross specimens to tissue cassettes
3	The histology laboratory: From tissue cassette to glass slides
4	Safety precautions for the grossing station
5	Photography and X-raying specimens
6	Quality assurance and avoiding errors in the grossing lab
7	Handling small biopsies
8	Handling of cytology specimens
9	How to handle specimens for lymphoma protocol
10	How to handle specimens for molecular testing
11	Specimen handling for other studies as immunofluorescence and cytogenetics
12	Handling of cytology specimens

Evaluation:

- Quizzes (2)
- An evaluation form will be filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission, safety precautions and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2203H: Practicum in Surgical Pathology - Part 2
Course Co-ordinator: Hala Faragalla

Course Objectives

- Develop competency in gross examination and dissection of breast, bone, and gastrointestinal organs.

- Develop expertise in identifying a spectrum of benign and malignant lesions
- Provide accurate macroscopic description of lesions of clinical significance
- Gain expertise and be able to submit appropriate sections for different entities to guide microscopic diagnosis and provide information for a generation of a complete pathology report for appropriate patient care.

Description

This is a 0.5 FCE practical hands-on training course. Candidates will spend 2 full days a week (6 hours per day) at one of the participating university hospitals. They will be shadowing certified PAs at a grossing workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. The course includes specimen orientation, identifying anatomical landmarks, inking, cutting, handling, macroscopic description and processing guidelines for large resections including breast and GI specimens. In this course the candidates will learn the specific techniques needed to examine, dissect and sample bone lesions, in addition they will be introduced to grossing breast specimens and gastrointestinal organs including a spectrum of benign and malignant lesions.

Week	Topics
1	General grossing guidelines for resections
2	Amputations and large resections
3	Lymph nodes and Extranodal lymphoma
4	Spleen
5	Breast specimens grossing guidelines #1 (Handling benign specimens).
6	Breast specimens grossing guidelines #2. (Handling malignant specimens and DCIS).
7	Sentinel lymph node biopsy and axillary dissection grossing guidelines in breast cancer.
8	Gastrointestinal tract specimens #1.Esophageal resections
9	Gastrointestinal tract specimens #2.Stomach
10	Gastrointestinal tract specimens #3. Small bowel
11	Gastrointestinal tract specimens #4.Colon
12	Gastrointestinal tract specimens #5. Appendix and Meckel diverticulum

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2204H: Practicum in Surgical Pathology - Part 3
Course Co-ordinator: Simon Raphael, Lorna Mirham

Course Objectives

- Develop competency in gross examination of gastrointestinal tract , genitourinary , and gynecologic specimens
- Develop expertise in identifying a spectrum of benign and malignant lesions
- Provide accurate macroscopic description of findings of clinical relevance
- Develop expertise to discuss and submit appropriate sections to guide microscopic diagnosis

Description

This is a 0.5 FCE practical hands-on training course. Candidates will spend 2 full days a week (6 hours per day) at one of the participating university hospitals. They will be shadowing certified PAs at a workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. The course includes an approach to inking, cutting, handling, macroscopic description and processing of GI and genitourinary organs. Candidates will learn the specific requirements of handling different pathologic entities in each of these organs. They will also gain expertise on the appropriate sections to be submitted accordingly.

Week	Topics
1	Gastrointestinal tract specimens #6. Hepatobiliary tract (liver resections)
2	Gastrointestinal tract specimens #7. Gallbladder resections
3	Gastrointestinal tract specimens #8.Pancreas
4	Genitourinary specimens #1. Kidney
5	Genitourinary specimens #2. Ureter
6	Genitourinary specimens #3. Urinary bladder
7	Genitourinary specimens #4. Prostate
8	Genitourinary specimens #5.Testis
9	Genitourinary specimens #6. Penis
10	Gynecologic specimens #1.Uterus
11	Gynecologic specimens #2.Cervix
12	Gynecologic specimens #3.Ovary

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2205H: Practicum in Surgical Pathology - Part 4
Course Co-ordinator: Nadia Ismiil

Course Objectives

- Develop competency in gross examination of gynecologic , head and neck , and lung resections
- Develop expertise in identifying a spectrum of benign and malignant lesions
- Provide accurate macroscopic description of findings of clinical relevance
- Describe, understand and be able to develop expertise to discuss and submit the appropriate sections to guide microscopic diagnosis

Description

This is a 0.5 FCE practical hands-on training course. Candidates will spend 2 full days a week (6 hours per day) at one of the participating university hospitals. They will be shadowing PAs at a grossing workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. The content focuses on obtaining practical experience in inking, cutting, handling, macroscopic description and processing for gynecological, lung, and head and neck specimens.

In this course, candidates will learn the specific requirements of handling different pathologic entities in each of these organs. They will also gain expertise on the appropriate number of sections to be submitted accordingly.

Week	Topics
1	Gynecologic specimens #4.Fallopian tube
2	Gynecologic specimens #5. Vagina
3	Gynecologic specimens # 6. Vulva
4	Head and neck specimens #1. Sinus and nasal polyps
5	Head and neck specimens #2.oral cavity resections
6	Head and neck specimens #3. Tongue resections
7	Head and neck specimens #4.Salivary gland resections
8	Head and neck specimens #5. Mucosal biopsies, adenoids and tonsils
9	Laryngeal resections
10	Lung resections
11	Pleural resections
12	Radical neck dissections

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2206H: Practicum in Autopsy Pathology
Course Co-ordinator: Jagdish Butany

Course Objectives

- Gain competency in performing medical autopsies in a hospital setting
- Describe and be familiar with basic definitions and procedures in autopsy
- Understand and appreciate ethical and confidentiality issues related to autopsy

Description

In this course students will learn the fundamentals of autopsy pathology as well as the post autopsy hands on training. Students will work on real cases under supervision and will be exposed to a variety of scenarios.

Outline of Topics

1. Fundamentals of Human Anatomy and Histology:

a) Anatomy of the Brain, circulation and major Cranial Nerves; Spinal cord, and structure of the Spinal column
b) Anatomy of the Head and Neck
c) Anatomy of the Chest
d) Anatomy of the Abdomen--wall and contents
e) Anatomy of the Pelvic organs
f) Anatomy of the limbs, emphasis on the circulation

2. Fundamentals of Autopsy Pathology– Classroom/seminar based teaching

a) Definition: What is an Autopsy? Reasons to request an Autopsy?
b) Who can request an Autopsy?
c) Hospital vs. Forensic (Coroners) cases (differences and similarities)
d) Coroner's Act
e) Different causes of death
f) External & internal examination – what to look for and make note of Post mortem changes – timeline & sequence of events
g) Types of injuries/wounds incisions, contusions, abrasions etc…
h) Wounds: accidental/ Homicidal/Bullet wounds
i) hat body tissues/fluids to save; How and why
j) Normal organ weights
k) Autopsy techniques (Virchow vs Rokitansky vs Letulle methods)
l) Restricted autopsies (e.g. brain only, chest only etc.) & special dissections (ex. Spinal cord, leg dissections for thrombus etc.)
m) Photography, Basics and the Importance of photography & how to take a good photograph
n) The autopsy table, requirements
o) The service try(s): what should it contain-tools, instruments etc.
p) Maintaining the autopsy tray, table and the room
q) Maintaining the Autopsy room.

3. Pre-Autopsy Preparation - Hands on training

a) Check List: Valid consent & paperwork
b) Identify the body
c) External examination
    - Weight, height, previous surgical scars, tattoos, eye & hair colour, any surface abnormality etc…
    - Rigor & Livor
    - Pre vs Post mortem injuries

4. Preforming Autopsy – Hands on training: Discussion with resident/pathologist before starting.

a) Y incision
b) Internal examination of organs in situ - check for fluid in cavities, organs in proper places, Sub diaphragmatic region etc.
c) Collection of forensic material (ex. Femoral blood, heart blood, urine, vitreous etc.)
d) Removal of block after careful examination & important anatomical landmarks
e) Dissection of block
    - Where to start, what vessels to probe for patency
    - How to properly slice organs
    - How to open the heart & measurements to take
    - Handling foreign bodies and medical devices
f) Brain removal
g) Pre and Post Check List

5. Post Autopsy – Hands on training:

a) The Morgue. Maintaining a Log of morgue activities
b) Daily activities morning
c) Returning tissue to body & closing
d) Releasing body to security/funeral home
e) Taking sections – How many and what to section and what to save for possible future reference
f) Quality
g) Decontamination

Evaluation

- Student keeps a log of all cases performed
- Performance evaluation by site director and faculty attendant

LMP 2207H: Practicum in Forensic Pathology
Course Co-ordinator: Michael Pickup

Course Objectives

- Gain competency in forensic pathology in a hospital setting including pre, basic, and special dissections
- Describe and be familiar with basic definitions and procedures in forensics
- Understand and appreciate ethical and confidentiality issues related to forensics

Description

In this course students will learn the fundamentals of forensic pathology as well as the hands-on training. Students will work on real cases under supervision and will be exposed to a variety of scenarios.

Week	Topics
1-2	TBD
3	PRE-DISSECTION 1 Continuity and Identification Body Handling External Examination Autopsy Observation
4	PRE-DISSECTION 2 Exhibit Continuity and Documentation Samples from the autopsy (vitreous humour, blood, urine, microbiology, etc.) Photography skills Autopsy Observation
5	BASIC DISSECTION & AUTOPSY SKILLS I Head & Neck
6	BASIC DISSECTION & AUTOPSY SKILLS II Basic Evisceration
7	BASIC DISSECTION & AUTOPSY SKILLS III Basic Evisceration
8	BASIC DISSECTION & AUTOPSY SKILLS IV Basic Evisceration
9	SPECIAL DISSECTION TECHNIQUES I Layered dissection of the anterior torso Layered dissection of the posterior torso
10	SPECIAL DISSECTION TECHNIQUES II Layered dissection of the anterior neck and face in an avascular field Removal of the spinal cord
11	SPECIAL DISSECTION TECHNIQUES III Layered dissection of the anterior torso Layered dissection of the posterior torso Layered dissection of the anterior neck and face in an avascular field Removal of the spinal cord
12	TRANSITION TO PRACTICE Function as a fully trained Pathologists' Assistant OBSERVED AUTOPSY DATE TO BE CONFIRMED ORAL EXAM DATE TO BE CONFIRMED

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant

- Candidates will go through a simulated grossing pathology quiz addressing the appropriate section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2208H: Biobanking for Research
Course Co-ordinator: Dianne Chadwick

Description
This is a 0.5 FCE lecture/seminar course with student presentations. The content focuses on principles and methodology of Biobanking patient samples for research. There will be an overview of types of biobanks and biospecimens, biobank methodology with particular emphasis on surgical tissue, and use of banked samples and molecular derivatives in research.

Week	Topics
1	Introduction to Biobanking
2	The Science of biobanking
3	The Practice of Biobanking
4	Biobanking Methodology I - Surgical specimens
5	Biobanking Methodology II - Non-Surgical Specimens
6	Quiz / Week 11 Research Paper Distribution
7	Biobanking Workflow (on-site)
8	Research Applications using Biospecimens
9	Ethics, Privacy, Informed Consent, Governance
10	Research Tools in Biospecimen Sciences
11	Small Group Research Paper Presentations
12	Quiz

Evaluation
- Small Group Research Paper Presentations and class discussion (60%)
- Quizzes (2) – conceptual and knowledge evaluation (20% - 2)

LMP2209H: Practicum in Surgical Pathology - Part 5
Course Co-ordinator: Ilan Weinreb

Course Objectives
- Develop competency in the surgical dissection of skin, cardiovascular, endocrine organs and neuropathology resections specimens.
- Develop expertise in identifying a spectrum of benign and malignant lesions
- Provide accurate macroscopic description of findings of clinical relevance
- Describe, understand and be able to discuss the appropriate sectioning to guide microscopic diagnosis

Description

This is a 0.5 FCE practical hands-on training course. Candidates will spend 2 full days a week (6 hours per day) at one of the participating university hospitals. They will be shadowing certified PAs at a workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. This course includes orientation, inking cutting, handling, macroscopic description and processing for skin, lymph nodes, endocrine organs and neuropathology.

Week	Topics
1	Macroscopic examination of cardiovascular system organs
2	Dermatopathology #1 (skin resections for carcinoma and Melanoma)
3	Dermatopathology #2 sentinel lymph node biopsy protocol in Melanoma
4	Thyroid
5	Parathyroid
6	Adrenal gland
7	Mediastinum resections (thymus)
8	Neuropathology specimens #1.Brain and dura biopsies
9	Neuropathology specimens #2.Brain resections
10	Neuropathology specimens #3. Eyes and lens
11	Neuropathology specimens #4.Nerve and muscle handling, grossing and processing
12	Neuropathology specimens #5. Subdural and subarachnoid hematoma evacuation

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed
- Attendance log sheet

LMP 2210H: Practicum in Surgical Pathology - Part 6
Course Co-ordinator: Carlo Hojilla

Course Objectives

- Develop competency in gross examination and of soft tissue specimens, lymph nodes, spleen and perinatal specimens
- Develop expertise in identifying a spectrum of benign and malignant lesions
- Provide accurate macroscopic description of specimens that is of clinical relevance
- Develop expertise to discuss and submit the appropriate sections to guide microscopic diagnosis

Description

This is a 0.5 FCE practical hands-on training course. Candidates will spend 2 full days a week (6 hours per day) at one of the participating university hospitals. They will be shadowing certified PAs at a workstation throughout the day. They will also have the opportunity to handle surgical specimens under supervision. Candidates will spend half of the rotation at Mount Sinai Hospital and the second half at the hospital for Sick Children. This course offers an approach to orientation, inking, cutting, handling, macroscopic description and processing of pediatric lung, liver, kidney, adrenal, small and large bowel (resections and biopsies [including wedges and needle cores]), pediatric and adult soft tissue specimens, lymph nodes, spleen and perinatal pathology. The pediatric component of this course would also include autopsies, particularly how to modify standard postmortem procedures to demonstrate congenital malformations. An introduction of what tissue should be obtained to assess for cytogenetic and metabolic diseases. Pediatric/fetal/infant organ removal including brain. This includes an introduction to perinatal and pediatric anatomy in addition to proper orientation and dissection of different type of lesions. This course will provide an emphasis on the importance of gross examination and section submission and how this provides the pathologist with important information pertinent to generate a complete pathology report that will subsequently affect the management plan.

Week	Topics
1	Soft tissue tumors #1
2	Soft tissue tumors #2
3	Bone Lesions
4	Neonatal autopsy
5	Perinatal surgical specimens
6	Perinatal pathology specimens - Placenta and POC
7	Pediatric abdominal tumours (kidney, liver, adrenal etc.) (SickKids)
8	Pediatric IBD resections (ileocolic, subtotal colectomy) (SickKids)
9	Pediatric heart explants, congenital cardiac anomalies and pediatric autopsy (SickKids)
10	Pediatric lung resections (tumours and non-tumours) (SickKids)
11	Pediatric liver resections for medical liver disease (biliary atresia, Kasai procedure etc.) including metabolic disease tissue handling (SickKids)
12	Pediatric brain and muscle biopsies (handling and processing) (SickKids)

Evaluation

- Quizzes (2)
- An evaluation form filled by the site director/pathology attendant
- Candidates will go through a simulated grossing pathology quiz addressing the appropriate anatomic landmarks, section submission and major drawbacks of the gross pathology examination
- A competency check list of organs grossed

- Attendance log sheet

Elective

Student will take one 0.5FTE graduate course offered in LMP or in any other department, with the approval of the Field Director. The course description and objectives are those of the course and the purpose of the course is to broaden the education of the students or to provide more in depth knowledge on a particular subject of interest to the student.

Appendix B: Graduate Calendar Copy

Laboratory Medicine and Pathobiology

LMP: Introduction
Faculty Affiliation: Medicine

Degree Programs

Laboratory Medicine and Pathobiology
MSc
PhD

Laboratory Medicine
MHSc

Program Description
The Master of Health Science in Laboratory Medicine is a two year professional (course work and practicum) Master's degree designed to educate and train highly skilled health laboratory scientists in one of two fields: Pathologists' Assistant (PA) or Clinical Embryology (CE). The program imparts general core knowledge and skills and the specific basic and applied principles of anatomic pathology or of assisted reproductive technology (ART) required to work as laboratory scientists. These principles are the foundation upon which PAs or CEs develop fundamental applied and practical knowledge and skills to function as competent, high quality clinical scientists. The nature of this graduate program equips trainees to apply their knowledge to complex decision making, to serious ethical issues and to develop a strong sense of personal accountability and intellectual rigour and independence.

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies and must also satisfy the additional admission requirements stated below
- Admission is based on demonstrated exceptional scholarly achievement, using the following criteria:
    - one page statement summarizing how this program will contribute to the advancement of the applicants' professional goals identifying their field of preference.
    - curriculum vitae (CV)
    - 2 letters of reference, one of which should be familiar with the candidate's scholarly activities
- Applicants must have an appropriate Bachelor of Science degree (B.Sc.) from a recognized university, with an average of at least B+ in the last two years of study. The students must have a demonstrated interest in human biological and life sciences, preferably with a major or specialist program in the life sciences. These programs prepare students for the study of biomedical science, for fluency in biomedical

terminology, and for critical evaluation of biomedical literature. Courses in human anatomy and physiology are desirable.

- All potential students will be interviewed prior to final acceptance into the program. The initial selection of students will be based on a combination of their academic record, individual statement and letters of reference. These students will be asked to participate in an interview with the Program Coordinator to determine the fit with the program and student's goals. Furthermore, the interview will provide initial direction for the Program Coordinator to identify appropriate practicum placements.
- Applicants who were educated outside Canada, whose primary language is not English, and who graduated from a university where the language of instruction was not English, must demonstrate proficiency in the English language through the successful completion of the:

    - Test of English as a Foreign Language (TOEFL) with the following minimum scores: Internet-based TOEFL: 100/120 and 22/30 on the writing and speaking sections.
    - Michigan English Language Assessment Battery (MELAB) Web; Required score: 95
    - International English Language Testing Systems (IELTS); Required score: 8.0 (Academic) with at least 6.5 for each component
    - Certificate of English Proficiency (COPE); Required score: 86 minimum total with at least 22 each component and 32 in writing
    - School of Continuing Studies, University of Toronto, "Academic English" course Required score: a final grade of B in Level 60 (Advanced)

Program Requirements

- **Coursework:** All students in both fields will be required to complete the following 4.0 FCE core courses
    - LMP 2000H, Cell and Molecular Biology (0.5 FCE)
    - LMP 2001H, Biomedical Research Methods (0.5 FCE)
    - LMP 2002H, Clinical Laboratory Management (0.5 FCE)
    - LMP 2003H, Biomedical Ethics (0.5 FCE)
    - LMP 2004H, Biostatistics (0.5 FCE)
    - LMP 2005Y, Capstone Project (1.0 FCE, continuous course)
    - 0.5 FCE elective
- Upon completion of these core courses, students will then pursue their field of choice and complete an additional courses
    - Clinical Embryology (4.0 FCE): LMP 2100H, LMP 2101H, LMP 2102H, LMP 2103H, LMP 2104H, LMP 2105H, LMP 2106H, LMP 2107H
    - Pathologists' Assistant (1.5 FCE): LMP 2202H, LMP 2201H, LMP 2208H
- To finish their training, students will be required to complete the following practicum courses
    - Clinical Embryology (1.5 FCE): LMP 2108H, LMP 2109H, LMP 2110H
    - Pathologists' Assistant (4.0 FCE): LMP 2202H, LMP 2203H, LMP 2004H, LMP 2205H, LMP 2206H, LMP 2207H, LMP 2209H, LMP 2210H

For students who fail a course, they will be offered remediation in the form of additional readings and assignments by the Course Director. If a student fails two courses or the offered remediation, they will be required to repeat the year.

Program Length
6 sessions full-time (typical registration sequence: F/W/S/F/W/S)

Time Limit
3 years full-time

Appendix C: Library Statement

UNIVERSITY OF TORONTO LIBRARIES

University of Toronto Libraries Report for

Master of Health Sciences in Laboratory Medicine, Department of Laboratory Medicine and Pathobiology, Faculty of Medicine, October 2018

Context: The University of Toronto Library (UTL) system is the largest academic library in Canada and is currently ranked 6th among academic research libraries in North America.[1] The UTL has an annual acquisition budget of $31 million. Its research and special collections comprise over 12 million print volumes, 5.6 million microforms, over 17,000 journal subscriptions, and rich collections of manuscripts, films, and cartographic materials. The system provides access to more than 1.9 million electronic books, journals, and primary source materials.[2] Numerous, wide-ranging collections, facilities and staff expertise reflect the breadth of research and instructional programs at the University, and attract unique donations of books and manuscripts from around the world, which in turn draw scholars for research and graduate work.

Major North American Research Libraries[3]					
	2011-2012	**2012-2013**	**2013-2014**	**2014-2015**	**2015-2016**
ARL RANK	**UNIVERSITY**	**UNIVERSITY**	**UNIVERSITY**	**UNIVERSITY**	**UNIVERSITY**
1	Harvard	Harvard	Harvard	Harvard	Harvard
2	Yale	Yale	Yale	Yale	Yale
3	**Toronto (3rd)**	**Toronto (3rd)**	**Toronto (3rd)**	Columbia	Michigan
4	Columbia	Columbia	Columbia	**Toronto (4th)**	Columbia
5	Michigan	Michigan	Michigan	Michigan	New York
6					**Toronto (6th)**

[1] Chronicle of Higher Education (2017). Spending by University Libraries, 2015-16. *Almanac of Higher Education 2017 – 2018*, LXIII (43), 64.

[2] Figures as of 2015 taken from UTL's 2016 Annual Report. http://www.library.utoronto.ca/library/aboutlibraries/annualreport/2016/AnnualReportUTL2016.pdf

[3] Chronicle of Higher Education (2017). Spending by University Libraries, 2015-16. *Almanac of Higher Education 2017 – 2018*, LXIII (43), 64.

Top 5 Canadian Universities in the ARL Ranking of Major North American Research Libraries				
2011-2012	**2012-2013**	**2013-2014**	**2014-2015**	**2015-2016**
RANK/UNIVERSITY	**RANK/UNIVERSITY**	**RANK/UNIVERSITY**	**RANK/UNIVERSITY**	**RANK/UNIVERSITY**
3/Toronto	**3/Toronto**	**3/Toronto**	**4/Toronto**	**6/Toronto**
10/British Columbia	18/Alberta	22/British Columbia	27/Alberta	31/Alberta
15/Alberta	24/British Columbia	26/Alberta	31/British Columbia	35/British Columbia
18/McGill	30/McGill	35/McGill	43/McGill	42/McGill
32/Montreal	35/Montreal	36/Montreal	49/Calgary	63/Calgary

Space and Access Services: The UTL's 44 libraries are divided into four administrative groups: Central, Departmental/local, Campus (UTM & UTSC) and Federated and Affiliated College Libraries. The UTL provides a variety of individual and group study spaces for students. Study space and computer facilities are available twenty four hours, five days per week at one location, Robarts Library, with additional extended hours during study and exam periods at both UTSC and UTM. Web-based services and electronic materials are accessible at all times from campus or remote locations.

Teaching, Learning & Research Support: Libraries play an important role in the linking of teaching and research in the University. To this end, information literacy instruction is offered to assist in meeting Master of Health Sciences in Laboratory Medicine degree level expectations in the ability to gather, evaluate and interpret information. Librarians collaborate with instructors on assignment design, provide student research consultations, and offer just-in-time student research help in person, by phone, or through online chat. Librarians are also available to support curriculum mapping initiatives. Special initiatives, such as an annual forum for student journal editors, extend information literacy beyond the classroom. These services align with the Association of College and Research Libraries (ACRL) *Framework for Information Literacy for Higher Education*.[4]

Program Specific Instructional Support: Instruction occurs at a variety of levels for science and health sciences students and is provided by faculty liaison librarians. The Gerstein Science Information Centre facilitates formal instruction integrated into the class schedule and hands-on tutorials related to course assignments. The Library, through its liaison librarians, customizes online research guides of library resources which can be linked in Quercus course pages. For example: *Searching the Literature: A guide to comprehensive searching in the health sciences* at https://guides.library.utoronto.ca/comprehensivesearching and *Systematic & Scoping Reviews: Methodology behind the search strategies* at https://guides.library.utoronto.ca/systematicreviews. Gerstein Librarians offer teaching and research support for students and faculty conducting systematic reviews and scoping reviews for coursework, thesis/dissertation requirements, or other research purposes.

[4] Association of College & Research Libraries. Framework for Information Literacy for Higher Education. ACRL, 2016. http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/infolit/Framework_ILHE.pdf

Collections: Many college and campus libraries collect materials in support of Master of Health Sciences in Laboratory Medicine; the largest collection of materials is centrally located at the Gerstein Science Information Centre. Collections are purchased in all formats to meet the variety of preferences and styles of our current students and faculty. The University of Toronto Library is committed to collecting both print and electronic materials in support of Master of Health Sciences in Laboratory Medicine at the University of Toronto.

Journals: The Library subscribes to all of the top 25 journals listed in *Journal Citation Reports* (JCR) in subject area Medical Laboratory Technology, all 25 in Pathology, 24 of the top 25 in subject area Obstetrics and Gynaecology, and all of the top 25 in subject area Reproductive Biology[5]. Of these titles, 96 are available electronically to staff and students of the University. We prioritize acquisition of online journals where possible.

Monographs: The UTL maintains comprehensive book approval plans with 51 book vendors worldwide. These plans ensure that the Library receives academic monographs from publishers all over the world in an efficient manner. In support of Master of Health Sciences in Laboratory Medicine, monographs are purchased in electronic form where possible, and the Library currently receives all current e-books directly from the following publishers: Springer, Elsevier, Wiley, LWW (Books@Ovid), Cambridge, and Karger.

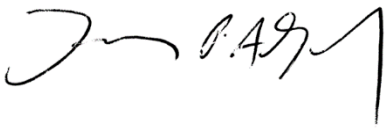
Preservation, Digitization, and Open Access: The UTL supports open access to scholarly communication and research information through its institutional research repository (known as T-Space), its Downsview print repository, its open journal services, subscriptions to open access publications, and support for preservation of research materials in all formats. In addition to acquiring materials in support of Master of Health Sciences in Laboratory Medicine, the Library has digitized its monograph holdings published before 1923. These books are available without charge to any Internet user.

Key Databases: *Medline, Embase, Scopus*

Special Collection Highlight: All students have access to the key evidence-based clinical care tools, including *DynaMed Plus* and *UpToDat*e as well as the drug and natural products information tools: *RxTx* from the Canadian Pharmacists Association; *Lexicomp Online*; *Micromedex*; and *Natural Medicines*.

Other Library-departmental engagement: Gerstein librarians participate in systematic, scoping and other knowledge syntheses in two capacities: consultants regarding comprehensive searching, relevant methodology, or citation management; or as collaborators and coauthors on the research team. This is part of the formal Systematic & Scoping Review Service which has the objective to increase research transparency and reproducibility.

Prepared by: Mikaela Gray, Liaison & Education Librarian, October 11th, 2018
Submitted by: Larry Alford, Chief Librarian, University of Toronto Libraries, February 19, 2019



[5] 2017 Journal Citation Reports® (Thomson Reuters, 2018)

Appendix D: Student Support Services

Student service information for Quality Assurance Framework

All University of Toronto undergraduate and graduate students have access to student services on all three campuses, Mississauga, St. George (downtown Toronto), and Scarborough, regardless of their 'home campus'. The services and co-curricular educational opportunities provide a complement to the formal curriculum by engaging and challenging students to reach their full potential as learners, leaders and citizens. At the University of Toronto (St. George Campus) these services are organized by Student Life Programs and Services, the academic division registrar offices, and the School of Graduate Studies. All these services combine to support the success of our students from the time they are admitted through degree completion and beyond.

Students have access to comprehensive **physical and mental health care** on campus, including a medical clinic, travel medicine services, immunization, contraception and sexual health education. Counselling and treatment options for psychological and emotional concerns include psychotherapy, group therapy and pharmacotherapy, as well as specialized assault counselling services provided both by the health and wellness centre and the Sexual Violence Prevention and Support Centre. In addition, a large number of wellness programs are provided, such as mindful meditation, workshops on coping skills and stress management.

Housing needs, including off-campus housing listings and resources for students living independently, are met through the Student Housing Service.

Coaching and education in the development of key **learning skills** – from time management to overcoming exam anxiety – is provided through the Academic Success Centre. The ASC also partners with faculty to integrate success strategies and support into the curriculum. Students' career exploration and employment services are provided through a **Career Centre** offering resume and interview coaching, workshops, career resources, on and off-campus employment and volunteer listings, job shadowing, and career counseling.

Specialized services are provided for **international students** (orientation, advising, cross-cultural counselling), students with **disabilities** (academic accommodations, advising), students with **children or other family responsibilities** (advising, resources, subsidized child care), **Indigenous students** (academic support, financial counselling) and **lesbian, gay, bisexual and transgender** students (counselling, referrals, equity outreach and engagement).

Participation in **campus life** and **experiential learning** are facilitated through Hart House (clubs, committees, events), the Centre for Community Partnerships (service learning and volunteer opportunities in community settings), the Multifaith Centre (interfaith dialogue, events), and the Student and Campus Development (leadership development, orientation, recognition and support for student groups, activities.) **Sport and recreational facilities and programs** are provided to all students through both Hart House and the Faculty of Kinesiology and Physical Education.

In the Office of the Vice Dean, Graduate and Academic Affairs in the Faculty of Medicine, is the Director of Mentorship, Professor Nana Lee, who works with students (with particular focus on professional master students) to advise them on their professional and career development prior to graduation.

School of Graduate Studies, Student Services [all campuses]

In addition to the above services available to all students, graduate student have access to registrarial services and co-curricular programs at the School of Graduate Studies that assist students in meeting their academic goals.

Administrative staff at the School of Graduate Studies (SGS) provide **registrarial** services to graduate students including but not limited to recruitment, admission, orientation, registration, fees, program progress, awards/financial assistance and graduation. Fully equipped meeting rooms, which can be booked by student groups when not used for Final Oral Examinations, are distributed across two locations, the newly renovated 63 St. George Street (home of SGS Student Services) and 65 St. George Street. Financial advising and wellness counselling services are also available at 63 St. George.

The **Grad Room** is an accessible space on the St. George campus which provides University of Toronto graduate students with a lounge area and a multi-purpose space for academic, social and professional graduate student programming. An additional lounge area for graduate students is now available at 63 St. George.

Grad Room is home to the **Graduate Professional Skills Program** (GPS). GPS is a non-academic program presented by SGS consisting of a variety of offerings that provide doctoral stream students a range of opportunities for professional skills development. The program focuses on skills beyond those conventionally learned within a disciplinary program, skills that may be critical to success in the wide range of careers that graduates enter, both within and outside academe. GPS aims to help students communicate effectively, plan and manage their time, be entrepreneurial, understand and apply ethical practices, and work effectively in teams and as leaders.

The **Conflict Resolution Centre for Graduate Students** offers support to the University of Toronto graduate community in taking steps to prevent or resolve conflict.
It is a peer-led services that welcomes graduate students to connect confidentially with one of our trained G2G Peer Advisors to talk about options and strategies for addressing a concern and available university supports and resources.

The Office of **English Language and Writing Support** (ELWS) provides graduate students with advanced training in academic writing and speaking. By emphasizing professional development rather than remediation, ELWS helps students cultivate the ability to diagnose and address the weaknesses in their oral and written work. ELWS offers four types of instruction designed to target the needs of both native and non-native speakers of English: non-credit courses, single-session workshops, individual writing consultations, and website resources.

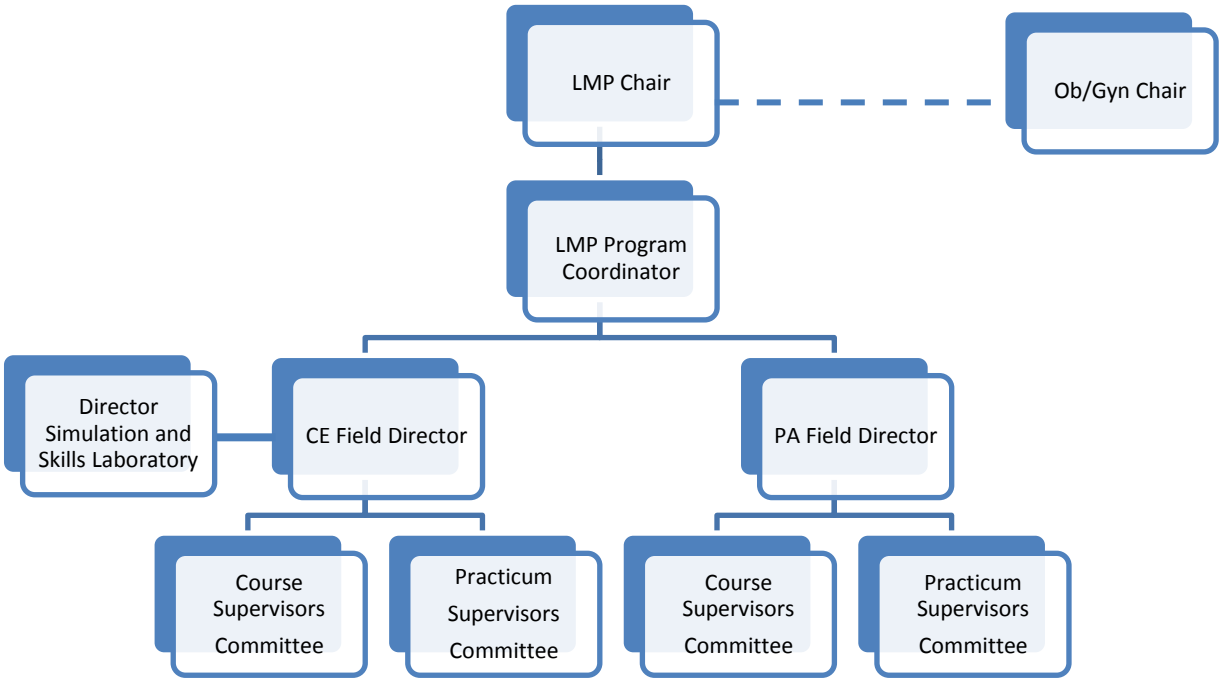
Faculty of Medicine

Starting September 2018, graduate students registered in any graduate program in the Faculty of Medicine will be able to access counselling services based in the Medical Sciences Building and at 500 University Ave.

Furthermore, any students wishing to explore career options are encouraged to make an appointment with the Director of Mentorship and Graduate Professional Development in Graduate Life & Science Education, Dr. Nana Lee.

Appendix E: Program Organizational Structure

A. Reporting Structure



B. Executive Committee

Program Coordinator (Chair), Avrum I. Gotlieb
CE Field Director, Heather Shapiro
PA Field Director, George Yousef

C. Curriculum and Oversight Committee

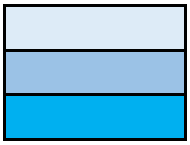
Program Coordinator (Chair)
CE Field Director
PA Field Director
Course Supervisors (2)
Practicum Supervisors (2)
Director, Simulation and Skills Laboratory
PA Representative (1)
CE Representative (1)
PA Field Student Representative (1)
CE Field Student Representative (1)

D. LMP Departmental Committees

Professional Graduate Curriculum Education Committee
Professional Graduate Appeals Committee

E. Admissions Committee

Appendix F: DLEs, Program Learning Outcomes & Requirements



Introductory
Intermediate
Expert

Number	Type of Learning Objective	Details	BOTH	PA	CE	Fall YR 1	Winter YR 1	Summer YR 1	Fall YR 2	Winter YR 2	Summer YR 2
L-01	Depth and Breadth of Knowledge	Understand the fundamental cell and molecular biology principles of pathology and reproductive technology used in the clinical laboratory.	x			LMP 2100H LMP 2000H LMP 2200H	LMP 2101H LMP 2201H	LMP2103	LMP 2106H		
L-02	Depth and Breadth of Knowledge	Identify gaps in knowledge that lead to research and clinical investigations	x			LMP 2001H	LMP 2102H	LMP 2103H	LMP 2005Y LMP 2105H LMP 2106H	LMP 2005Y	LMP 2005Y
L-03	Depth and Breadth of Knowledge	Understanding the principles of laboratory quality assurance	x				LMP 2002H	LMP 2104H LMP 2202H LMP 2203H	LMP 2105H LMP 2204H LMP 2205H	LMP 2206H LMP 2207H LMP 2208H	LMP 2209H LMP 2210H
L-04	Depth and Breadth of Knowledge	Identify and list the etiology and pathogenesis of human diseases		x		LMP 2000H LMP 2200H	LMP 2201H				
L-05	Depth and Breadth of Knowledge	Recognize tissue specimen variation and decide which laboratory approaches are best suited to each type of variation		x				LMP 2202H LMP 2203H	LMP 2204H LMP 2205H	LMP2206 LMP 2207H LMP 2208H	LMP 2209H LMP 2210H
L-06	Depth and Breadth of Knowledge	Understand reproductive physiology and the underlying pathophysiology leading to common causes of infertility			x	LMP 2100H	LMP 2101H LMP 2102H	LMP 2103H	LMP 2106H		
L-07	Depth and Breadth of Knowledge	Know current ART procedures, their indications, strenghs, and limitations			x	LMP 2100H	LMP 2102H	LMP 2104H	LMP 2105H LMP 2107H		
L-08	Research and Scholarship	Critically read and interpret research and clinical literature in the disciplines of pathology or ART	x			LMP2000H LMP 2001H	LMP 2102H	LMP 2004H	LMP 2105H LMP 2106H LMP2005Y	LMP 2005Y	LMP2005Y
L-09	Research and Scholarship	Understand the principles involved in developing a viable research proposal	x			LMP 2001H	LMP2003	LMP 2004H	LMP 2005Y	LMP 2005Y LMP 2208H	LMP 2005Y

L-10	Research and Scholarship	Critically assess technologies for their appropriate use and effectiveness	x			LMP 2001H	LMP 2102H	LMP 2203H	LMP 2005Y LMP 2105H LMP2107	LMP 2005Y	LMP 2005Y
L-11	Application of Knowledge	Know when and how to use statistical tests	x			LMP 2001H		LMP 2004H			
L-12	Application of Knowledge	Apply quality assurance processes in the clinical lab	x				LMP 2002H LMP 2102H	LMP 2104H	LMP 2107H	LMP 2108H LMP 2109H LMP 2206H LMP 2207H	LPM2110
L-13	Application of Knowledge	Recommend and justify the need for follow-up evaluation and/or procedures based on initial findings and clinical context	x				LMP 2102H	LMP 2104H LMP 2202H LMP 2203H	LMP 2107H LMP 2204H LMP 2205H	LMP 2206H LMP 2207H	LMP 2209H LMP 2210H
L-14	Application of Knowledge	Interpret clinical pathology results with an understanding of the inherent strengths and limitations of an individual procedure		x		LMP 2200H	LMP 2201H	LMP 2202H LMP 2203H	LMP 2204H LMP 2205H	LMP 2206H LMP 2207H	LMP 2209H LMP 2210H
L-15	Application of Knowledge	Use patient medical and hospital records to guide clinical work		x				LMP 2202H LMP 2203H	LMP 2204H LMP 2205H	LMP 2206H LMP 2207H	LMP 2209H LMP 2210H
L-16	Application of Knowledge	Be able to assess oocytes, sperm, and embryos			x			LMP 2102H LMP 2104H		LMP 2108H LMP 2109H	LMP 2110H
L-17	Application of Knowledge	Perform simulation laboratory techniques used in ART			x					LMP 2108H LMP 2109H	
L-18	Professional Capacity/ Autonomy	Know, and be able to apply ethical standards for clinical laboratory science	x				LMP 2003H	LMP 2104H LMP 2202H	LMP 2105H LMP 2107H	LMP2206 LMP 2207H LMP2208H	
L-19	Professional Capacity/ Autonomy	Know and follow the professional guidelines for communication of clinical findings	x				LMP 2003H	LMP 2103H LMP 2203H	LMP 2107H LMP 2204H LMP2205H	LMP 2206H LMP 2207H LMP2208H	LMP 2209H LMP 2210H
L-20	Professional Capacity/ Autonomy	Appreciate the consequence of growing availability of cell and molecular biology information on clinical medicine	x			LMP 2000H		LMP 2103H LMP 2203H	LMP 2107H LMP 2204H LMP 2205H	LMP 2206H LMP 2207H LMP 2208H	LMP 2209H LMP 2210H
L-21	Professional Capacity/ Autonomy	Understand how the embryologist can provide patient centered care			x		LMP 2003H	LMP 2104H	LMP 2107H		
L-22	Communication Skills	Create written and oral presentations on research topics and literature	x						LMP 2106H LMP 2005Y LMP 2107H	LMP 2005Y	LMP 2005Y
L-23	Communication Skills	Synthesize complex information in written and oral form to present to appropriate stakeholders	x					LMP 2103H LMP 2104H LMP 2002H LMP 2203H	LMP 2005Y LMP 2105H LMP 2204H LMP 2205H	LMP 2005Y LMP 2206H LMP 2207H LMP 2208H	LMP 2005Y LMP 2110H LMP 2209H LMP 2210H

Appendix G: Comparable PA & CE Programs

Current PA Graduate Programs in Canada[1]

Institution	Program	Length	Number of students per year	Other Details
University of Alberta	Master of Pathologists' Assistant (MScPA)	2 years	2	National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). Eligible for CCCPA certification.
University of Calgary	Master of Pathologists' Assistant (MDPA)	2 years	4-5	National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). Eligible for CCCPA certification.
University of Western Ontario	Masters of Clinical Sciences-Pathologists' Assistant (MSISc)	2 years	5	National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).
University of Manitoba	Masters of Science-Pathologists' Assistant (MSc-PA)	2 years	2 students every second year	Not accredited

Current PA Graduate Programs in the United States of America[1]

Institution	Program	Length	Number of Students per year	Other Details
University of Maryland School of Medicine (Baltimore, MD)	Master of Science	22 consecutive months	10	Accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) Eligible to take the American Society of Clinical Pathology (ASCP) certification examination.
Drexel University (Philadelphia, PA)	Master of Science in Pathologists' Assistant (PathA)	2 years	12	Accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
Duke University (Durham, NC)	Master of Health Science	2 years	6-8	In addition to the accreditation of Duke University School of Medicine, The Pathologists' Assistant Program is individually Accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). This program certifies graduates to sit for the ASCP Board of Certification examination
West Virginia University (Morgantown, WV)	Master of Health Science	2 years	Up to 16	Accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). Eligible to sit for the ASCP (American Society of Clinical Pathologists) exam.

Current CE Graduate Programs[2]

Institution	Degree	Duration
University of Oxford, England	MSc in Clinical Embryology	12 months, full-time
University of Dundee, Scotland	MSc Human Clinical Embryology and Assisted Conception	12 months, full-time
University of Leeds, England	MSc Clinical Embryology	24 months Distance learning
University of Valencia, Spain	Master Degree in the Biotechnology of Human Assisted Reproduction and Embryology	12 months Virtual classroom
Monash University, Australia	Intensive Master of Clinical Embryology	12 months, full-time 24 months, part-time
University of Nottingham, England	Master in Medical Science (MMedSci) Assisted Reproductive Technology	12 months, full-time
Eastern Virginia Medical School, Virginia, USA	M.S. in Reproductive Clinical Science	2 years
Northwestern University, Chicago, USA	MS in Reproductive Science and Medicine	12 months for non-thesis, full-time

Notes

[1] All programs listed are full-time. To our knowledge there are no Pathologists' Assistant graduate programs (or equivalent) that are part-time.

[2] To our knowledge there are no Clinical Embryology graduate programs (or equivalent) that exist in Canada.

Appendix H: Letters of Support

October 9, 2018

We were very excited to hear about the new Masters in Health Science, which has as one of its goals to train and educate Pathologist's Assistants. In the hospital pathology departments, these individuals are pathologist extenders and are critical for an efficiently functioning department. They are highly trained individuals, who under the supervision of the pathologist, make critical medical decisions. For this reason, it is very important that they be highly trained at a Master's level. In support of their importance, there are very few pathology laboratories that do not have such individuals and usually several of them.

There is a growing need for Pathologist's Assistants as the specimens in hospitals become increasingly complex. Additionally, there is demand for these individuals in sites outside of Pathology labs such as Forensics, research labs, and biobanks to mention just some other positions they hold in the healthcare system. For this reason, there are always hospital labs that are searching for Pathologist's Assistants. It is not unusual to see multiple advertisements for jobs. This is not surprising the few Pathologist's Assistants programs that current exist across Canada.

Thus, the program that Laboratory Medicine and Pathobiology is developing in conjunction with Obstetrics and Gynaecology is filling a great need that will have societal impact. We, the undersigned, are very enthusiastically supportive of this initiative. We also gladly commit to training these learners in our departments. As a group, given our diversity, we will be able to offer training in all the areas that they will need in their practicums. The students will not have to travel out of the city as we are able to provide a rich and stimulating environment that will promote excellence and exposure to a superb training experience. If we can help you in anyway, please let us know.

Sincerely,

Victor Tron, Chief
St. Michael's Hospital

David Hwang, Chief
Sunnybrook Health Sciences Centre

Michael Pollanen, Chief Forensic Pathologist
Ontario Forensic Pathology Service Forensic Services

Susan Richardson, Interim Chief
The Hospital for Sick Children

Simon Raphael, Chief
North York General Hospital

Matthew Cesari, Chief
Trillium Health Partners

Sebastian Karavattathayyil
Toronto East General Hospital

Rita Kandel, Professor & Chair
Laboratory Medicine & Pathobiology, UofT

Runjan Chetty, Medical Director
Toronto General Hospital

CANADIAN FERTILITY AND ANDROLOGY SOCIETY
SOCIÉTÉ CANADIENNE DE FERTILITÉ ET D'ANDROLOGIE

January 12, 2018,

Professor Trevor Young,
Dean, Faculty of Medicine
University of Toronto

Dear Professor Young,

I am writing this letter in support of the application for the new degree course, Masters of Laboratory Health Science, ART Stream at the University of Toronto.

The societal need for a Masters level education in this area is undeniable. Canada is the only developed country that does not offer formal education in Embryology. The CFAS is committed to ensuring safe and effective treatment fertility treatment, and standardized education and certification of embryologists is vital to achieving this goal.

The CFAS has worked with the University of Toronto for continuing professional development courses in the past and many of its faculty have contributed a great deal to the field of assisted reproduction in the areas of public policy, science, medicine, law, mental health, and ethics. Therefore, the CFAS believes that the University of Toronto, among all the universities in Canada, is best prepared to provide the degree program in embryology. We are aware of the extensive physical and human resources available and we welcome the opportunity to work with the university and respective department in future educational endeavours.

Of note, the CFAS has created a voluntary competency exam for practising embryologists and andrologists using the same testing development methodology as is used to qualify foreign physicians in Canada. The first cohort scheduled to take exams in April 2018. We would be very happy to collaborate with your curriculum development committee to ensure the relevant content is provided.

We commend the University of Toronto for advancing this initiative to strengthen the field and practice of embryology in Canada - an effort that will further establish Canada as a leading place for the provision of safe, effective, and advanced assisted reproductive care.

Sincerely,

Jason Min MD
President, CFAS

Mark Evans
Executive Director, CFAS

Cc: Board of Directors

1719 rue Grand Trunk • Suite 301 • Montreal • Quebec • H3K 1M1 • Canada
Tel. 514.524.9009 • Fax 514.524.2163 • info@cfas.ca • www.cfas.ca

Appendix I: Acronyms and Abbreviations

AAPA	American Association of Pathologists' Assistants
ACRL	Association of College and Research Libraries
ART	Assisted Reproductive Technology
ASCP	American Society for Clinical Pathology
C/PSI	Clinical or Practice Supervisor
CA	Clinical Adjunct
CAP	Canadian Association of Pathologists
CapI	Capstone Instructor
CCCPA	Canadian Certification Council of Pathologists' Assistants
CCCPA	Course Coordinator
CE	Clinical Embryologist
CF	Clinical Faculty
CI	Course Instructor
CSB	Cell and Systems Biology
ELWS	English Language and Writing Support
FCE	Full Course Equivalent
FD	Field Director
HCPC	Health Care Professional Council
HFEA	Human Fertilization Embryology Authority
IHPME	Institute of Health Policy, Management and Evaluation
IMS	Institute of Medical Sciences
LMP	Laboratory Medicine and Pathobiology
MHSc	Masters of Health Sciences
MOHLTC	Ministry of Health and Long Term Care
NAACLS	National Accreditation Agency for Clinical Laboratory Services
OB/GYN	Obstetrics and Gynecology
PA	Pathologists' Assistant
PC	Program Coordinator
PGME	Postgraduate Medical Education
SGS	School of Graduate Studies
SO	Status Only
TS	Teaching Stream
U of T	University of Toronto
UME	Undergraduate Medical Education
UTL	University of Toronto Library
UTM	University of Toronto Mississauga
UTQAP	University of Toronto Quality Assurance Process
UTSC	University of Toronto Scarborough

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

FOR APPROVAL

TO:	Faculty Council
SPONSOR:	Allan Kaplan, Vice-Dean, Graduate and Academic Affairs
CONTACT INFO:	Rachel Zulla, Graduate Affairs Officer; 416-946-0412; rachel.zulla@utoronto.ca
DATE:	April 22, 2019
AGENDA ITEM:	**5.2**
ITEM OF BUSINESS:	Major Modification, Redesigning the curriculum for the MSc and PhD program in Molecular Genetics

JURISDICTIONAL INFORMATION:

The University of Toronto Quality Assurance Process dictates that major modifications require the approval of divisional governance. The By-laws of the Faculty of Medicine Faculty Council dictate that major modifications are approved by the Education Committee and Faculty Council. The proposal may also need to be approved by the Research Committee, as determined by the FOM Executive Committee.

GOVERNANCE PATH:

1. Education Committee [For recommendation] – February 28, 2019
2. Faculty Council [For approval] – April 22, 2019

CONSULTATIVE PATH:

The proposal has been seen and approved by the following committee(s) at the Faculty of Medicine

- GLSE Graduate Curriculum Committee, December 5, 2018

HIGHLIGHTS:

Redesigning the MSc and PhD curriculum in Molecular Genetics to introduce a 'core' set of courses that emphasize foundational knowledge in molecular genetics and experimental approaches that all new graduate students will take.

PROPOSED MOTION

> *"THAT the proposed Major Modification to the MSc and PhD Program in Molecular Genetics be approved as submitted."*

University of Toronto
Major Modification Proposal:
Significant Modifications to Existing Graduate and Undergraduate Programs

This template should be used to bring forward all proposals for major modifications to existing graduate and undergraduate programs for governance approval under the University of Toronto's Quality Assurance Process.

Program being modified:	MSc and PhD program in Molecular Genetics
Proposed major modification:	Redesigning the curriculum to introduce a 'core' set of courses that emphasize foundational knowledge in molecular genetics and experimental approaches that all new graduate students will take.
Department/unit (if applicable):	Molecular Genetics
Faculty/academic division:	Medicine
Dean's office contact:	Allan Kaplan, Vice Dean, Graduate and Academic Affairs
Proponent:	Leah Cowen, Chair, Department of Molecular Genetics
Version date:	December 4, 2018

1 Summary

- Please provide a brief summary of the change(s) being proposed as it relates to the current structure of the program.

Through our regular supervisory committee meetings and exams (reclassification/ qualification), it has long been argued by faculty that our graduate students could improve upon their foundational knowledge as it relates to molecular genetics. Having such foundational knowledge would better prepare students to pursue their research goals. Currently, there is no uniform foundational knowledge taught to our students aside from scientific presentation skills. Currently, we offer 30 different 0.25 FCE specialized 'topic' courses and MSc students choose two of these 'topic' courses to complete MMG1012H, and PhD students chose five of these 'topic' courses to complete MMG1012H, MMG1016H, and MMG1017H.

To address the lack of foundational courses, we are proposing two compulsory 'core' courses (MMG 1001H (0.5 FCE) and MMG 1002H (0.5 FCE)) for all new M.Sc. and Ph.D. students that will provide graduate-level education on fundamental knowledge and experimental approaches of molecular genetics, to be taken in the student's first year.

MMG 1001H, Foundational Genetic Approaches I, will consist of three units (genetics, genomics, proteins) that will be taught in sequence for five weeks each in the fall. Scheduling of the course is in line with the norms of the department, and the start and end dates will align with the calendar. MMG 1001H will adopt a partially flipped classroom model. The incoming class will be divided into smaller groups of approximately 15 students each. Content (terms, explanatory youtube videos, and papers) will be communicated online using existing infrastructure (Quercus). Theoretical experimental problems related to content will be assigned to each group. Classroom hours will be used for lectures, small group discussions of potential solutions to the assigned problem, discussions of a draft papers from BioRxiv,

and finally, presentations of solutions to the assigned problems to the entire class, all on a weekley basis for the duration of the course.

MMG 1002H will consist of two units that will be taught in sequence in the winter term. The first unit will be a ten week colliquim, centred around invited departmental seminar speakers of international repute. The second unit will be six weeks of computational biology.

Four of the five units (genetics, genomics, proteins, and computational biology) will be adapted and significantly modified from our existing 0.25 FTE topic courses that are currently being offered to our students. The rationale for their reorganzation from the current topic structure is:

- the current topic courses do not emphasize foundational knowledge and are typically not taught from a problem-solving perspective.
- these 4 units have been identified as important areas that should be included in the proposed foundational curriculum. In the current curriculum, students were given a choice of thirty 0.25 FCE 'topic' courses and may not have chosen 'topic' courses that were related to these foundational units.

The colloquium unit that is part of MMG 1002H is based on our current MMG1010H colloquium course with only slight modifications (see the proposed curriculum in section 4 for more details).

To accomodate MMG 1001H and 1002H without compromising a student's time for research and time to completion, we propose several changes in the structure of our current MSc and PhD program that will result in similar (MSc) or fewer (PhD) 'classroom' hours. These changes are:

- Reducing the previous MMG 1010H from 12 weeks to 10 weeks (which is incorporated into MMG1002H)
- Reducing the number of student seminars students must attend from 70% to below 60%
- Reducing the number of years PhD students attend student seminars. Currently, our PhD students give their MMG 1017H seminar in their fifth year. Consequently, they currently have to attend 70% of seminars for 3 additional years (beyond their first two years pre-qualification/reclassification). Instead, we propose that PhD students give their final seminar in their fourth year (third and fourth year seminars are proposed to be the new course MMG1031Y), not their fifth, which helps reduce the demand on their time.
- Reducing the number of post-qualification/reclassification 0.25 FCE topic courses that PhD students take from three to two (which will be the MMG1041H course).
- Eliminating 0.25 FCE topic course requirements for MSc students. The academic rationale for eliminating the topic course requirements in the MSc program is that we think foundational knowledge is more important that formal field specific knowledge (and we cannot include both in the MSc program because it would create an excessive demand on students' time).

In addition to meeting our stated academic rationale for the change in curriculum, we believe that the new program has several secondary benefits, including:

- Front-end loading our graduate student's 'classroom' education. We believe that arming our students with critical foundational knowledge early in their program will: i) facilitate their progress through their degree by giving them foundational knowledge earlier; and ii) give our students more research time (and less class-room time) during the period when there are hitting their research 'stride'. We anticipate that the end result of this structural change will be more substantial research insights and a potentially reduced time-to-completion.
- Reduced class sizes within our 0.25 FCE 'topic' courses. Currently, our ~30 'topic' courses are open to all graduate students. In the proposed revised curriculum, the 'topic' courses will be reserved for PhD students, thereby decreasing class size and increasing the depth of discussion and education that will ensue.

- The creation of a system that facilitates the 'classroom' education for a larger number of students. This prevents our course curriculum from becoming a bottleneck to expanded enrolment should our department wish to continue increasing the number of students we accept.
- The creation of many new teaching assistant (TA) positions (up to 10) for senior PhD students. The MMG 1001H core course will require more teaching assistants to support small group activities, which our budget will support. This increased TA support has the added benefit of providing more TA opportunities for our senior PhD students.

As outlined below in greater detail:

- MSc students will take the four new courses MMG1001H, MMG1002H, MMG1011H, and MMG1021H.
- Students who reclassify from our MSc program into the PhD program will have completed MMG1001H, MMG1002H, MMG1011H, and MMG1021H in their first 18 months of graduate school, and these courses will not be required to be re-taken as part of the reclassified student's PhD program.
- Direct entry PhD students will take MMG1001H, MMGH1002H, MMG1011H, and MMG1021H.
- Regular stream PhD students (who have earned their MSc in a department other than the Department of Molecular Genetics) will be asked to take MMG1001H, MMG1002H, MMG1011H, and MMG1021H as part of conditional admission.
- Regular stream PhD students (who have earned their MSc in the Department of Molecular Genetics) will not be asked to retake MMG1001H, MMG1002H, MMG1011H, and MMG1021H.
- All PhD students will also take MMG1031Y and MMG1041H.

The program learning outcomes of the MSc and PhD in Molecular Genetics are not changing as a result of this proposal. The changes in the curriculum will support student achievment of the existing program learning outcomes.

2 Effective Date

September of 2019.

3 Academic Rationale

- What are the academic reasons for the change proposed, and how do they fit with the unit's and division's academic plans?

The primary rationale for the proposed changes is to increase the graduate-level core foundational knowledge of our graduate students. This early, graduate-level foundational knowledge is essential to fostering our student's creativity and insight with their research projects. In turn, this will lead to better research productivity, and the capacity for increased creative thinking amoung our graduates, which is in line with our Department's and Faculty's academic goals. We also hope this early investment in foundational knowledge will ultimately increase productivity and in turn, decrease the student's time to completion.

4 Description of the Proposed Major Modification(s)

- Please describe in detail what changes are being proposed. Major modifications include changes to the program requirements that will significantly change what students will know and be able to do when they complete the program.
- Other major modifications that may be included are significant changes to admissions requirements, significant changes to faculty engaged in program and; a change to mode of delivery, change to the language of the program and offering the program at another location or institution.
- Please be explicit about how the learning outcomes have changed and include both previous and proposed learning outcomes or one version of the current learning outcomes with the new learning outcome in track changes. You may wish to use Appendices A and B.
- Describe how the modification reflects universal design principles and/or how the potential need to provide mental or physical health accommodations has been considered in the development of this modification.
- Please provide calendar copy, either in track changes or as two separate documents in appendices C and D as applicable.

Current Curriculum

M.Sc. Curriculum (137 contact hours)
(289 total hours (contact+ anticipated preparation))

MMG 1010H, Molecular Genetics Colloquium (0.5 FTE): 12 week colloquium; **84 hours total**
(**48 contact hours**; 36 study hours)

MMG 1012H, Topics in Molecular Genetics (0.5 FTE): two 6 week topic courses; **120 hours total**
(**24 contact hours**; 48 hours of study; 48 hours for two culminating assignments)).

MMG 1015Y, Seminar (1.0 FTE): two student seminars; **85 hours total**
-seminar 1: **9 contact hours**; 10 preparation hours (for their own seminar)
-seminar 2: students must attend 70% of student seminars, which there are on average 40 hours worth per year, equating to a total of **56 hours of attendance** (40*2*0.7); 10 hours of preparation time (for their own seminar).

Ph.D. Curriculum (257 contact hours, which includes the 137 contact hours from the MSc)
(563 total hours (contact+ anticipated preparation), which include the 289 MSc hours)
Notes:
Ph.D. students who reclassified from our M.Sc. program will have taken MMG 1010H, 1012H, and 1015Y.
Ph.D. direct entry students (who have a B.Sc. but not an M.Sc.) must take MMG 1010H, 1012H, and 1015Y.
Ph.D. students (who enter into our program with an M.Sc.) must take MMG 1010H, 1012H, and 1015Y, but can receive permission to waive the MMG 1012 course requirement from their supervisor committee if they have the equivalent graduate-level courses from their M.Sc.

MMG 1016H, Topics in Molecular Genetics II (0.5 FTE): two 6 week topic courses; **120 hours total** (**24 contact hours**; 48 hours of study; 48 hours for two culminating assignments).

MMG 1017H, Topics in Molecular Genetics III (0.5 FTE): one student seminar and one additional topic course; **154 hours total**
-topic course: **12 contact hours**; 24 hours of study; 24 hours for one culminating assignments
-the MMG 1017 seminar: Ph.D. students must attend 70% of student seminars while enrolled in MMG 1017Y (which concludes when the student gives their seminar, typically in their fifth year). Given that there are on average, 40 hours worth of seminars per year, equating to a total of **84 hours of attendance** (40*3*0.7); 10 hours of preparation time (for their own seminar)).

Proposed Curriculum

M.Sc. Curriculum (142.5 contact hours)
(270.5 total hours (contact + anticipated preparation))

(NEW COURSE) MMG 1001H, Foundational Genetic Approaches I (0.5 FTE): three 5 week units (genetics, genomics, proteins); **97.5 hours total (37.5 contact hours)**
-offered every fall to incoming new students
-each unit has ~2.5 hours of contact time per week, plus ~ 4 hours of preparatory work per week (6.5 hours x 15 weeks).

(NEW COURSE) MMG 1002H, Foundational Genetic Approaches II (0.5 FTE): one 10 week colloquium course plus one 6 week computational biology unit course offered at the conclusion of the colloquium; **103 hours total (55 contact hours)**.
-offered every winter to new students
-the 10 week colloquium course is the old MMG 1010H reduced from 12 weeks to 10 weeks (40 contact hours; 30 study hours).
-the computation biology unit has ~2.5 hours of contact time per week (15 contact hours total), plus ~ 3 hours of preparatory work per week (18 hours of prep work) (33 hours total).
-students will have the option of choosing an entry-level programming computational biology unit or an advanced level computational biology course

(MODIFIED COURSE) MMG1011H, Seminars I (0.5 FTE): First year seminars
Here, we are breaking up the old MMG 1015Y, which ran for two years, into two courses, one per each year. MMG1011H is the first year course. ~38 hours total.
-one seminar that the student presents (10 preparation hours)
-attendance at 60% of the MSc seminars (there are ~100 MSc seminars per year; 100 X 0.6 X 20 minutes/seminar = 20 hours
-attendance at 10 PhD seminars= 5 hours (each PhD seminar is ~30 minutes)

(MODIFIED COURSE) MMG1021H, Seminars II (0.5 FTE): Second year seminars
Here, we are breaking up the old MMG 1015Y, which ran for two years, into two courses, one per each year. MMG1021H is the second year course. ~38 hours total.
-one seminar that the student presents (10 preparation hours)
-attendance at 60% of the MSc seminars (there are ~100 MSc seminars per year; 100 X 0.6 X 20 minutes/seminar = 20 hours
-attendance at 10 PhD seminars= 5 hours (each PhD seminar is ~30 minutes)

Ph.D. Curriculum (211.5 contact hours, which includes the 142.5 MSc contact hours)
(445.5 total hours (contact + anticipated preparation), which includes the 270.5 total hours from the MSc)

Notes:

- Ph.D. direct entry students must take MMG 1001H, 1002H, 1011H, and MMG1021H as well as MMG1031Y and MMG1041H (3.5 FCEs).
- Regular stream Ph.D. students who enter with a U of T MSc in Molecular Genetics must take MMG1031Y and MMG1041H (1.5 FCEs)
- Regular stream PhD students who enter into our program with an M.Sc. from outside of our department must take MMG1031Y and MMG1041H. As a condition of their admission, in order to support their success in the program, they may be required to take MMG 1001H, 1002H, 1011H, and MMG1021H (up to 3.5 FCEs).
- Ph.D. students who reclassified from our M.Sc. program will have already taken MMG 1001H, 1002H, 1011H, and MMG1021H in their master's registration and will take MMG1031Y and MMG 1041H after they transfer to the PhD. (3.5 FCEs total)

(NEW COURSE) MMG 1031Y, Seminars III (1.0 FTE): Third and fourth year seminars.
-one seminar that the student presents in their fourth year (~10 hours of prep time)
-attendance at 60% of the PhD seminars (~25-35 seminars/year= 15 contact hours/year)
-attendance at 20 MSc seminars (10 during year three; 10 during year four) (~15 contact hours total);
58 hours total (48 contact hours)

(EXISTING COURSE-but changed name from MMG1016H to MMG1041H)
MMG1041H, Topics in Molecular Genetics (0.5 FTE): two 6 week topic courses; **120 hours total (24 contact hours)**
(24 contact hours; 48 hours of study; 48 hours total for two culminating assignments)).

Courses to be retired after all students who have enrolled prior to the fall of 2019 have graduated.
MMG 1010
MMG 1012
MMG1015
MMG1016
MMG 1017

5 Impact of the Change on Students

- Outline the expected impact on continuing students, if any, and how they will be accommodated.
- Please detail any consultation with students.

Only incoming students starting in Fall 2019 and beyond will be required to complete the new program.

Impact on Students Enrolled Prior to the Fall of 2019
In the transition from the current curriculum to the proposed curriculum, the only impact on continuing students will be to benefit from smaller 0.25 FTE topic course class sizes because the new incoming MSc students will not be eligible to take topic courses until they reclassify into the PhD program or qualify (after 18 months in the program).

Students enrolled prior to the Fall of 2019 will be expected to complete their degree with the same expectations and requirements under which they were admitted. They will be ineligible to enrol in MMG1001H and MMG1002H.

Consultation with Students

We consulted with our current student body by circulating the proposed plan to them and soliciting feedback electronically and in a town hall meeting hosted by the departmental administration (Vice-Chair, Peter Roy, Graduate Coordinator, Julie Brill, and Associate Graduate Coordinator, Ian Scott).

Below, we highlight our key findings from the consultation process:

- In general, students agreed that there should be more foundational knowledge earlier in their program and that the proposed program changes would be beneficial.
- Students were concerned that MMG1001H and MMG1002H would be too much like an undergraduate class. However, after presenting the students with a course outline (after the survey had been taken, and during our conversation with our students at the town hall meeting (see below), students became confident that the material will be presented and examined at a level appropriate for graduate school.
- Students were genuinely concerned about the decrease in the required number of student seminars that students are required to attend. Currently, we require students to attend 70%, and in our initial proposal, we decreased the fraction required to 40%. In response to this concern, we raised the requirement to 60% in the current draft of the proposal.
- Students suggested that we (the departmental administration) have more oversight for our MMG1012/MMG1016/MMG1017 0.25 FCE topic courses to ensure that the material presented is not out-dated and that quality is maintained. This is not an issue that is specific to the proposed curriculum, but applies equally to the old and the proposed curriculum. In response, key members of the departmental leadership (Chair, Vice-Chair, Graduate Coordinator, and Associate Graduate Coordinator) developed several new mechanisms of oversight, including mandatory and advanced syllabus submission by course instructors, bi-annual surveys of our student body for their opinions of topic course quality, and mechanisms to ensure that the departmental administration reviews all individual topic course surveys conducted at the conclusion of each topic course.

Consultation with Faculty

We circulated a draft proposal in early February to faculty members of the Dept. of Molecular Genetics. We solicited their feedback on the draft proposal via email and via a town hall meeting that the departmental leadership hosted on February 20th, 2018. The highlights of faculty consultation are as follows:

- Over 90% of faculty members who voiced an opinion were in strong favour of implementing the proposed curriculum.
- There was some debate over the mechanism by which we should test the students learning in MMG1001. Consensus was reached in agreeing to test the understanding of concepts through open book tests of assigned subject matter to encourage the examination of learned concepts and not trivial details.
- There was some debate over the order in which to offer MMG1001 and MMG1002. It was agreed that providing the foundational knowledge of MMG1001 best preceded the colloquium content of MMG1002.

We also circulated a revised draft proposal via email late in November and responses were unanimously positive.

6 Consultation

- Describe the impact of the major modification on other programs and any consultation undertaken with the Dean and chair/director of relevant academic units.

In addition to extensive consultation within the Department of Molecular Genetics among faculty and students (both with an early draft of the proposal in early 2018, and with a more developed proposal in November/December of 2018), this major modification has received consultation from the Office of the Vice Dean, Graduate and Life Sciences (Vice Dean, Allan Kaplan and Rachel Zulla, Graduate Affairs Officer).

7 Resources

- Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries and enrolment/admissions.
- Please be specific where this may impact significant enrolment agreements with the Faculty/Provost's office.
- Indicate if the major modification will affect any existing agreements with other institutions, or will require the creation of a new agreement to facilitate the major modification (e.g., Memorandum of Understanding, Memorandum of Agreement, etc). Please consult with the Provost's office (vp.academicprograms@utoronto.ca) regarding any implications to existing or new agreements.

- The course content that will be delivered online as part of MMG 1001H will be delivered using existing infrastructure (Quercus) and will not require the construction of new infrastructure.
- The proposed changes will not impact our faculty complement or libraries.
- MMG 1001H will require a large space to run group activities, but this can be met with existing infrastructure within the Donnelly Centre and the Medical Sciences Building.
- MMG 1001H will require more teaching assistants to support small group activities in the flipped classroom, which our budget will support. This increased TA support has the added benefit of providing more TA opportunities for our senior graduate students, of which there is currently a dearth.
- The proposed change to our curriculum has the additional benefit of allowing our program to provide formal classroom education for a larger number of students, and relieves pressure on our existing topic courses. This prevents our formal course curriculum from being a bottleneck to expanded enrolment should our department wish to continue increasing the number of students we accept at some point in the future.
- We expect that the proposed changes will have no impact on any current agreements.

8 UTQAP Process

The UTQAP pathway is summarized in the table below.

Steps	**Approvals**
Development/consultation within unit	Jan-October, 2018
Consultation with Dean's office (and VPAP)	August –October 2018
	Unit-level approval as appropriate
	Faculty/divisional council
Submission to Provost's office	
Reported to the Provost and included in annual report to AP&P	
Ontario Quality Council—reported annually	

9 Appendix A: Current Calendar Copy with Changes Tracked

Molecular Genetics: Molecular Genetics MSc

Master of Science

Program Description

The MSc program offers research training in a broad range of genetic systems from bacteria and viruses to humans. Research projects include DNA repair, recombination and segregation, transcription, RNA splicing and catalysis, regulation of gene expression, signal transduction, interactions of host cells with bacteria and viruses, developmental genetics of simpler organisms (yeast, worms and fruit flies) as well as more complex organisms (fish and mice), molecular neurobiology, molecular immunology, cancer biology and virology, structural biology, and human genetics and gene therapy.

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Molecular Genetics' additional admission requirements stated below.
- Normally, a BSc or MD degree or equivalent with excellent academic credentials in molecular biology, genetics, microbiology, and/or biochemistry. Applicants trained in other quantitative sciences (math, physics, chemistry, computer science, engineering, etc.) are also strongly encouraged to apply.

Program Requirements

- ~~Successful completion of MMG 1010H, MMG 1012H[0] (or equivalent), and MMG 1015Y[0] (seminar course).~~
- Successful completion of 2.0 FCEs: MMG 1001H, MMG 1002H, MMG 1011H, and MMG 1021H
- A thesis on a research project.
- Defence of the thesis at an oral examination.
- Students are required to spend 12 months in full-time attendance.

Program Length

6 sessions full-time (typical registration sequence: F/W/S/F/W/S)

Time Limit

3 years

[0] *Course that may continue over a program. The course is graded when completed.*

Molecular Genetics: Molecular Genetics PhD

Doctor of Philosophy

Program Description

The PhD program offers research training in a broad range of genetic systems from bacteria and viruses to humans. Research projects include DNA repair, recombination and segregation, transcription, RNA splicing and catalysis, regulation of gene expression, signal transduction, interactions of host cells with bacteria and viruses, developmental genetics of simple organisms (yeast, worms and fruit flies) as well as complex organisms (fish and mice), molecular neurobiology, molecular immunology, cancer biology and virology, structural biology, and human genetics and gene therapy.

Applicants may enter the PhD program via one of three routes: 1) following completion of an MSc degree; 2) transfer from the University of Toronto MSc program; or 3) direct entry following completion of a BSc, MD, or equivalent degree.

PhD Program

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Molecular Genetics' additional admission requirements stated below.
- Students with a BSc degree, an MD degree, or equivalent may be accepted directly into the PhD program.
- An MSc degree from the University of Toronto or another recognized university. As a condition of admission, applicants who have completed their MSc outside of the Department may be required to complete additional course requirements.
- Normally, an MSc degree or equivalent with wet or dry lab experience related to molecular biology, genetics, microbiology, and/or biochemistry is required. Applicants trained in other quantitative sciences (math, physics, chemistry, computer science, engineering, etc.) are also strongly encouraged to apply.
- Attainment of minimum admission standards does not guarantee acceptance into the PhD program.

Program Requirements

- Successful completion of MMG 1010H, MMG 1012H^0 (or equivalent), and MMG 1015Y^0 (seminar course), MMG 1016H^0 (or equivalent), and MMG 1017H^0.
- A thesis on a research project.
- Students entering the doctoral program from a master's program, either through transfer or admission, must spend a minimum of two sessions in full-time attendance. Students entering the doctoral program from a bachelor's program must spend a minimum of three sessions in full-time attendance.
- Successful completion of a Qualification Examination in Year 2.
- The Qualifying Exam consists of the submission of a written proposal and an oral examination.
- If a student is unsuccessful at the first attempt at the Qualifying Exam, there are three possible outcomes:

- the student may retake the oral exam within four to eight weeks without revision of the written proposal;
- the student may submit a revised written proposal and retake the oral exam within four to eight weeks;
- or the student may withdraw from the program.

Program Length

4 years full-time

Time Limit

6 years full-time

PhD Program Direct-Entry

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Molecular Genetics' additional admission requirements stated below.
- Students with a BSc degree, an MD degree, or equivalent may be accepted directly into the PhD program.
- Normally, a BSc degree or equivalent with academic credentials and wet or dry lab experience related to molecular biology, genetics, microbiology, and/or biochemistry is required. Applicants trained in other quantitative sciences (math, physics, chemistry, computer science, engineering, etc.) are also strongly encouraged to apply.
- Attainment of minimum admission standards does not guarantee acceptance into the PhD program.

Program Requirements

- ~~Successful completion of 3.5 FCEs: MMG 1001H, MMG 1002H, MMG 1011H, MMG 1021H, MMG 1031Y, and MMG 1041H.~~
- Successful completion of 1.5 FCEs: MMG 1031Y and MMG 1041H
- A thesis on a research project.
- Students entering the doctoral program from a bachelor's program must spend a minimum of three sessions in full-time attendance.
- Successful completion of a Qualification Examination in Year 2.
- The Qualifying Exam consists of the submission of a written proposal and an oral examination.
- If a student is unsuccessful at the first attempt at the Qualifying Exam, there are three possible outcomes: The student may retake the oral exam within four to eight weeks without revision of the written proposal; the student may submit a revised written proposal and retake the oral exam within four to eight weeks; or the student may withdraw from the program.

Program Length

5 years direct-entry

Time Limit

7 years direct-entry

PhD Program Transfer-from-master's

Transfer Requirements

- Transfer applicants must be enrolled in the Department of Molecular Genetics MSc program
- Students must have successfully completed MMG 1001H, MMG 1002H, MMG 1011H, and must have completed or be enrolled in MMG 1021H in order to qualify to transfer to the PhD program.
- Transfer applicants must successfully complete a reclassification transfer exam within 24 months of being initially enrolled in the MSc program.

Program Requirements

- Successful completion of 1.5 FCEs: MMG 1031Y and MMG 1041H.
- A thesis on a research project.
- Students transferring to the doctoral program from a master's program must spend a minimum of two sessions in full-time attendance.
- Successful completion of a Qualification Examination in Year 2.
- The Qualifying Exam consists of the submission of a written proposal and an oral examination.
- If a student is unsuccessful at the first attempt at the Qualifying Exam, there are three possible outcomes: The student may retake the oral exam within four to eight weeks without revision of the written proposal; the student may submit a revised written proposal and retake the oral exam within four to eight weeks; or the student may withdraw from the program.

Program Length

5 years transfer-from-master's

Time Limit

7 years transfer-from-master's

Molecular Genetics: Molecular Genetics MSc, PhD Courses

JBB 1425H	Structural Biology: Principles and Practice
JBB 2025H	Protein Crystallography
JDB 1024Y	Topics in Developmental Biology
JDB 1025H	Developmental Biology

JDB 1026Y	Student Seminars in Developmental Biology
~~MMG 1010H~~	~~Molecular Genetics Colloquium~~
MMG 1001H	Foundational Genetic Approaches I
MMG 1002H	Foundational Genetic Approaches II
MMG 1011H	Student Seminars I
~~MMG 1012H[0]~~	~~Topics in Molecular Genetics I (formerly MMG 1012Y[0])~~
~~MMG 1015Y[0]~~	~~Seminar~~
~~MMG 1016H[0]~~	~~Topics in Molecular Genetics II (formerly MMG 1014Y[0])~~
~~MMG 1017H[0]~~	~~Topics in Molecular Genetics III~~
MMG 1021H	Student Seminars II
MMG 1031Y	Student Seminar III
MMG 1041H	Topics in Molecular Genetics
MMG 1420H	Regulation of Gene Expression
MMG 1425H	Signal Transduction and Cell Cycle Regulation
MMG 1451H	Genetic Analysis of Development: Yeast and Worms

[0] *Course that may continue over a program. The course is graded when completed.*

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

FOR APPROVAL

TO:	Faculty Council
SPONSOR:	Allan Kaplan, Vice-Dean, Graduate and Academic Affairs
CONTACT INFO:	Rachel Zulla, Graduate Affairs Officer; 416-946-0412; rachel.zulla@utoronto.ca
DATE:	April 22, 2019
AGENDA ITEM:	**5.2**
ITEM OF BUSINESS:	Closure of Program – Master of Health Science (MHSc) in Medical Radiation Sciences

JURISDICTIONAL INFORMATION:

The University of Toronto Quality Assurance Process dictates that the closure of a degree program requires the approval of divisional and university governance. The By-laws of the Faculty of Medicine Faculty Council dictate that a proposal to close a degree program be approved by the Education Committee and Faculty Council, and may be seen by other standing committees at the divisional level as deemed appropriate.

GOVERNANCE PATH:

1. Education Committee [For recommendation] – February 28, 2019
2. Faculty Council [For approval] – April 22, 2019

CONSULTATIVE PATH:

The proposal has been seen and approved by the following committees at the Faculty of Medicine

- GLSE Graduate Curriculum Committee, February 13, 2019

HIGHLIGHTS:

This is a proposal to close the professional Master's degree program, Master of Health Science in Medical Radiation Sciences (MHScMRS).

PROPOSED MOTION:

"THAT the proposal to close the Master of Health Science in Medical Radiation Sciences be approved as submitted."

UNIVERSITY OF TORONTO

University of Toronto Proposal for the Closure of an Existing Program (Graduate or Undergraduate)

(This template has been developed in line with the University of Toronto's Quality Assurance Process.)

The process followed for the closure of any program is the same as that required for the approval of any new such program.

Closure Proposed: **Please specify precisely what is being closed:**	Master of Health Science, Medical Radiation Sciences
Department / Unit (if applicable):	Institute of Medical Science (IMS)
Faculty / Academic Division:	Medicine
Faculty / Academic Division contact:	Allan Kaplan, Vice Dean, Graduate and Academic Affairs Rachel Zulla, Graduate Affairs Officer, Graduate and Life Sciences Education
Department / Unit contact:	Mingyao Liu, Director, IMS
Effective date program was administratively suspended to new admissions:	June 2018
Effective date of full closure of program:	August 31, 2019
Version Date:	February 15, 2019

1 Brief Summary

- *Please clarify precisely what is being closed*
- *What is the relationship between what is being closed and any remaining offerings:*
    - *If only part of a program is being closed, please clarify the relationship between this and those portions of the program that will remain open*

This is a proposal to close the professional Master's degree program, Master of Health Science in Medical Radiation Sciences (MHScMRS). The degree program is housed in the Institute of Medical Science. Faculty teaching in the program have their U of T appointments in the Department of Radiation Oncology, a clinical department in the Faculty of Medicine and are graduate members of the Institute of Medical Science. The effective date of the closure will be August 31, 2019. There was one student registered in 2018-19 who completed her degree program requirements on January 18, 2019, and will graduate in June 2019. Admissions to the program were administratively suspended in June 2018.

2 Rationale

Background:

- *You may wish to speak to when the program was first created / how long has it been offered / past success of the program*
- *What has led to the decision to close the program?*
- *Please provide a full academic rationale*
    - *You may wish to refer to changing enrolment; changing disciplinary landscape; shifting expertise of the professoriate; poor quality of the academic offering; overlap with other existing programs*
    - *Where appropriate, you may want to quote from recent unit or program reviews.*
    - *Explain alignment with the unit's academic plan*

The MHScMRS program was developed to prepare expert radiation therapists, who have a bachelor's degree in medical radiation sciences or in an equivalent field, for practice at an advanced level within the evolving radiation medicine domain. It received its first student cohort in 2009 and has graduated a total of 12 students as of December 2018. There is one student who has completed the program requirements as of January 18, 2019. This student has been recommended for June 2019 convocation.

The demand for this program has consistently been modest since its inception, without a clear trend for improvement. We believe the reasons for this low enrollment rate are multiple. Primarily, changes anticipated in the practice environment have been slow to take hold. These relate mostly to the successful pilot project conducted in Ontario testing an optional model of radiation treatment delivery that centred on the development and implementation of a new "advanced practice" radiation therapist role. The conversion of this

work from pilot project to permanent integration has been much slower than expected with jurisdictions outside of Ontario still lacking the momentum to uptake the new model of care. This has resulted in an inadequate applicant pool for the program (limited primarily to local applicants due to the uniqueness of the radiation therapy specialty role in Canada at this time). While the quality of our program has always been seen to be high and the department remains committed to development of radiation therapy as a profession, the sustainability of the program in its current format has been a challenge due to the small number of students and high investments associated with developing and maintaining the program curriculum.

Despite our concerted effort to promote the program and address many of these issues in the past 10 years, we were not able to generate a sustained pool of students to the program. After multiple consultations with the faculty, management and radiation therapists' representatives, the decision was made to request closure of this program.

3 Impact on other programs/units of the proposed closure

- *Please provide evidence of consultation with any programs/units/faculties that will be affected*
- *What are the positive and negative implications that need to be considered in the closure*
- *Impact on the nature and quality of the division's program of study*
- *Impact of closure on other units including inter-divisional and inter-institutional agreements/contracts*
- *Please mention if the courses that supported this degree, program, or program option will continue to be offered*

In consultation, IMS and the Department of Radiation Oncology agree that there is little or no impact on other programs/units/faculties with this proposed closure. All mandatory courses of this program will be closed. However, there is intention to repurpose some content to other enrichment activities for trainees in the clinical department and/or as continuous professional development opportunities for practicing professionals in radiation medicine.

4 Student Accommodation

Please include:

Current enrolment showing breakdown by year in the program / option being closed

Table 1: Graduate Enrolment Breakdown

Year	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
Total Enrolment	3	2	4	4	3	3	0	3	3	1 (recommended to graduate

- *Provide details concerning how students in progress will be accommodated*
    - *Will students be allowed to complete their program or be transferred to another program. (In the latter instance please comment on the ease with which they can complete the requirements of the new program and show evidence of consultation if relevant)*
    - *Deadline by which accommodated students must complete the program – if there are grounds for concern, what are their options if they have not completed the program by that deadline?*
    - *Capacity/course availability to accommodate affected students*
    - *Can inactive students reactivate to the closed program?*
- *What will the impact of the proposed closure be on the range of academic options available to students in the future? (i.e. are there other programs or options that will fill the void that may/may not be created by the closure?)*
- *Consultation with students*
    - *Please provide details concerning consultation with students around the proposed change including:*
        - *Meetings / Town halls/ Emails /Questionnaires*
        - *Describe any response/ feedback received*
    - *How will students be notified of the change following approval?*
    -

The MHScMRS program is dedicated to supporting the one current student in the program to see them to completion. This student has completed all program requirements and has been recommended for graduation for June 2019. There are no anticipated issues.
As part of the consultation leading up to this proposal, the program conducted a review of other academic opportunities available to future students. Several options were identified including other "online" international programs. For example, Sheffield Hallam University in Sheffield, UK offers several course based master's degree – Radiation Oncology in Practice and Advanced Practice. They also offer case based postgraduate diplomas in the radiation oncology domain. Trinity College Dublin in Ireland also offers a course based master's degree in Advanced Practice.

Given the low enrolment over the last nine years, the closure of this program is not expected to have a great impact on the radiation therapy community.

5 Faculty / Staff Accommodation

- *What is the impact, if any, on faculty and staff of the closure?*

The faculty who delivered the program are clinical, status only faculty in the Department of Radiation Oncology with graduate appointments in the Institute of Medical Science. These faculty participate in educational programs as part of their academic commitment to the department.

The closure of the MHScMRS will have little impact on the faculty's ability to find teaching opportunities. With undergraduate, graduate, fellowship and continuing medical education initiatives, plenty of opportunities continue to exist. It is anticipated, therefore, that there is little to no impact on faculty, staff or department. The activities of the current Program Director will be redirected to other priorities within the clinical unit.

6 Governance Process

	Levels of Approval Required
Decanal / Provostial Sign-Off	
	Faculty/Divisional Council (approval of closure of minors, where there is a continuing (specialist or major)
Submission to Provost's Office	
	AP&P (approval of program closures: undergrad specialists/majors; minors where there is no specialist of major; graduate fields or diploma, and collaborative programs)
	Academic Board (approval of degree, graduate program, diploma closures)
	Executive Committee of Governing Council (executive confirms degree, grad program, closures)
Inclusion in Annual report to Quality Council	
Inclusion in Annual report to MTCU (in case of closure of degree)	

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

FOR APPROVAL

TO:	Faculty Council
SPONSOR:	Allan Kaplan, Vice-Dean, Graduate and Academic Affairs
CONTACT INFO:	Rachel Zulla, Graduate Affairs Officer; 416-946-0412; rachel.zulla@utoronto.ca
DATE:	April 22, 2019
AGENDA ITEM:	**5.2**
ITEM OF BUSINESS:	Major Modification, Redesigning the curriculum for the MSc in Occupational Therapy

JURISDICTIONAL INFORMATION:

The University of Toronto Quality Assurance Process dictates that major modifications require the approval of divisional governance. The By-laws of the Faculty of Medicine Faculty Council dictate that major modifications are approved by the Education Committee and Faculty Council. The proposal may also need to be approved by the Research Committee, as determined by the FOM Executive Committee.

GOVERNANCE PATH:

1. Education Committee [For recommendation] – February 28, 2019
2. Faculty Council [For approval] – April 22, 2019

CONSULTATIVE PATH:

The proposal has been seen and approved by the following committee(s) at the Faculty of Medicine

- GLSE Graduate Curriculum Committee, December 5, 2018

HIGHLIGHTS:

The 24-month, full-time Master of Science in Occupational Therapy is proposing several changes to its program requirements and timing of existing courses. Below is an outline of what these changes are and attached is a curriculum map to distinguish between the current and proposed curriculum changes. Furthermore, the number of program FCEs changes from 18.0 to 18.5

PROPOSED MOTION

> *"THAT the revised curriculum for the MSc in Occupational Therapy be approved as submitted."*

University of Toronto
Major Modification Proposal:

Significant Modifications to Existing Graduate and Undergraduate Programs

This template should be used to bring forward all proposals for major modifications to existing graduate and undergraduate programs for governance approval under the University of Toronto's Quality Assurance Process.

Program being modified: Please specify exactly what program and which components of that are being modified; e.g., BA…specialist, major and minor components.	Master of Science in Occupational Therapy
Proposed major modification:	Changes in timing of courses and course titles; merging two courses into one; and shifting content from existing courses into two new courses .
Department/unit (if applicable):	Occupational Sciences and Occupational Therapy
Faculty/academic division:	Medicine/Division 4
Dean's office contact:	Allan Kaplan, Vice Dean, Graduate and Academic Affairs
Proponent:	Deirdre Dawson, Vice-Chair, Education, Department of Occupational Sciences and Occupational Therapy Susan Rappolt, Chair, Department of Occupational Sciences and Occupational Therapy
Version date:	March 22, 2019

1 Summary

Please provide a brief summary of the change(s) being proposed as it relates to the current structure of the program.

The 24-month, full-time Master of Science in Occupational Therapy is proposing several changes to its program requirements and timing of existing courses. Below is an outline of what these changes are and attached is a curriculum map to distinguish between the current and proposed curriculum changes. Furthermore, the number of program FCEs changes from 18.0 to 18.5

Modifications to Existing Courses:

1. Two courses have been combined (OCT1121H: Research Issues and Approaches in Occupational Therapy - Term 1 & OCT1122H: Methods in Research –Based Occupational Therapy Practice - term 2) to form one full year course: OCT1122Y: Research Approaches and Methods in Occupational Therapy. This full year (1.0FCE) course will run in Terms 2 and 3.
2. OCT1220Y: Graduate Research Project will start in Term 3 and continue through Terms 4, 5 and part of 6.
3. OCT1161H: Enabling Occupation with Adults will move to Term 4 from Term 3. The new course number will be OCT1261H to reflect the course being in year 2.
4. OCT1262Y: Enabling Occupation with Adults: Part II will occur only in Term 5 rather than across Terms 4 & 5.
5. The number of weeks of classes in Term 5 (currently 11 weeks) which contains three Enabling themed courses (OCT1252H: Occupational Therapy with Children: Part II; OCT1262Y: Enabling Occupation with Adults: Part II; OCT1272: Enabling Occupation with Older Adults: Part II) will be shortened by 2 weeks.
6. OCT1152Y: Musculoskeletal Structure and Function Perspectives in Occupational Therapy will begin in Term 1 and extend across Terms 1 and 2. The course number will be changed to OCT1151Y to reflect the course implementation across two terms
7. The course titles of three courses will be changed as follows:
   a) OCT 1162Y: Psychosocial Perspectives in Occupational Therapy to new course title - Mental Health Foundations for Occupational Therapy Practice;
   b) OCT1152Y: Musculoskeletal Structure and Function Perspectives in Occupational Therapy to new course title - Musculo-Skeletal Foundations for Occupational Therapy Practice;
   c) OCT1172Y: Neuro-motor /Neuro-cognitive Perspectives in Occupational Therapy to new course title - Neurological Foundations for Occupational Therapy Practice.
8. The timing of the final fieldwork course OCT1283Y: Occupational Therapy Fieldwork IV will be shifted 1 week later
9. Term 6 will move from having 3 weeks to 6 weeks of classes

New Courses

1. OCT1193H: Enabling Occupation across the Life Course
2. OCT1122Y: Research Approaches and Methods in Occupational Therapy
3. OCT1236H: Transition to Occupational Therapy Practice

Deleting Courses

1. OCT 1121H, OCT1122H and 1123H (which will be combined to create OCT1122Y)

2 Effective Date

Changes will be implemented for cohort starting in the Fall of 2019. Thus, term 2 changes will be winter (January-April) 2020, term 3 changes will be in spring 2020 and so on.

3 Academic Rationale

What are the academic reasons for the change proposed, and how do they fit with the unit's and division's academic plans?

The Department of Occupational Sciences and Occupational Therapy has undertaken a curriculum review and renewal process starting the Summer of 2017. The proposed changes resulted from this process and are outlined in this proposal.

Through the curriculum review process, the Department became aware of redundancies in a number of areas in the curriculum and identified specific places where student learning could be optimized and better scaffolding of the curriculum to optimize critical thinking and skill development among the students could be provided.

4 Description of the Proposed Major Modification(s)

- Please describe in detail what changes are being proposed. Major modifications include changes to the program requirements that will significantly change what students will know and be able to do when they complete the program.
- Other major modifications that may be included are significant changes to admissions requirements, significant changes to faculty engaged in program and; a change to mode of delivery, change to the language of the program and offering the program at another location or institution.
- Please be explicit about how the learning outcomes have changed and include both previous and proposed learning outcomes or one version of the current learning outcomes with the new learning outcome in track changes. You may wish to use Appendices A and B.
- Describe how the modification reflects universal design principles and/or how the potential need to provide mental or physical health accommodations has been considered in the development of this modification.
- Please provide calendar copy, either in track changes or as two separate documents in appendices C and D as applicable.

The program and learning outcomes of the MScOT program remain the same despite the curricular changes proposed below:

1) Changes in research related courses

OCT 1121H, OCT1122H and 1123H will be combined to create OCT1122Y: Research Foundations in Occupational Therapy by removing redundancies and careful realignment with the Graduate Research Project (OCT1220Y). The review process provided insight into the challenges of students engaging in OS & OT specific research methods and approaches before

they had learned the foundations of the discipline. Thus, we propose beginning the research theme courses in Term 2 (rather than term 1).

2) Changes in enabling occupation themed courses (enabling themed courses together provide all content related to interventions and treatments in occupational therapy)
Through the curriculum review process, we became aware:

i) That students were having difficulty applying 'enabling occupation' principles, strategies and techniques from one client age group to another as each was taught in relation to a specific age group;
ii) Of places where there was redundancy, with similar content being taught in three different age group courses;
iii) That a life course perspective (the life course perspective elaborates the importance of time, context, process, and meaning on human development and family life), an important perspective in OS & OT, was missing due to the way the courses were set up.

Thus, we propose introducing enabling occupation in a new course in Term 3 (OCT1193H: Enabling Occupation across the Life Course) that addresses both life course and similarities in approaches across the life span.

Once OCT1193H is complete, the other enabling courses will be taught in Terms 4 & 5. The introduction of this new course, however, means that we will be able to remove 2 weeks of classes from Term 5.

3) Other changes
a) The proposal to move OCT1152Y: Musculoskeletal Structure and Function Perspectives in Occupational Therapy to extend across Terms 1 and 2 (rather than being situated in Term 2) was made for three reasons: (1) it extends the foundational material covered in Term 1; (2) it supports the research theme starting in Term 2 and thus being able to build on foundational material taught in Term 1); (3) it balances the workload more appropriately over Terms 1 and 2 as students had highlighted that Term 2 had a heavier workload which they attributed to OCT1152Y.

b) The proposed changes in course titles for OCT1152Y: Musculoskeletal Structure and Function Perspectives in Occupational Therapy **to Musculo-Skeletal Foundations for Occupational Therapy Practice**; OCT1162Y from Psychosocial Perspectives in Occupational Therapy **to Mental Health Foundations for Occupational Therapy Practice** and OCT1172Y: Neuro-motor /Neuro-cognitive Perspectives in Occupational Therapy **to Neurological Foundations for Occupational Therapy Practice** better reflects the content of these course and shows that they are aligned in content related to different practice areas.

c) The proposal to start the final fieldwork course OCT1283Y: Occupational Therapy Fieldwork IV 1 week later allows the introduction of a **new course** in Term 6 titled OCT1236H: Transition to Occupational Therapy Practice, which will be designed to 1) allow students to self-direct their learning in order to best prepare for their transition to their desired areas of practice

and (2) provide opportunities for enhanced integration of academic theory with skills needed for clinical practice. The removal of 2 weeks of classes from Term 5 and moving Fieldwork IV one week later, means that Term 6 can be six weeks long and allows for the introduction of this new course. Thus, this course will exist of approximately 3 weeks of existing material reorganized, 1 week of material from Term 5 and 2 weeks of new material.

5 Impact of the Change on Students

Outline the expected impact on continuing students, if any, and how they will be accommodated.
Please detail any consultation with students.

The proposed changes will affect all full-time students entering the 24-month program **beginning in September 2019**. The anticipated impact will be:

- Enhanced active engagement of students across the curriculum
- Increased transparency of the way the curriculum is scaffolded to all students and faculty
- Enriched student understanding between theoretical foundations and core and domain specific skill development.

Ultimately, we anticipate our graduating students will better prepared to practice in the changing practice environment and within emerging roles.

6 Consultation

Describe the impact of the major modification on other programs and any consultation undertaken with the Dean and chair/director of relevant academic units.

The proposed changes developed over the course of 1.5 years of meetings and consultations including:

- student feedback;
- curriculum renewal retreats
- consultations with the fieldwork coordinator, professional curriculum committee (including student representation), individual faculty whose courses are being affected, all core faculty (through our Departmental Advisory Committee), the Vice-Chair Education and the Department Chair.

At a curriculum renewal retreat in November 2018, the final changes were agreed upon. These have subsequently been reviewed again by the professional curriculum

committee (including student representation), individual faculty whose courses are being affected, all core faculty (through our Departmental Advisory Committee), the Vice-Chair Education and the Department Chair.

7 Resources

Describe any resource implications of the change(s) including, but not limited to, faculty complement, space, libraries and enrolment/admissions.
Please be specific where this may impact significant enrolment agreements with the Faculty/Provost's office.
Indicate if the major modification will affect any existing agreements with other institutions, or will require the creation of a new agreement to facilitate the major modification (e.g., Memorandum of Understanding, Memorandum of Agreement, etc). Please consult with the Provost's office (vp.academicprograms@utoronto.ca) regarding any implications to existing or new agreements.

Faculty will be required to be available to teach courses in the terms to which courses have been moved.

As one course has been dropped (one research course) and two courses added (Enabling occupation across the life course; Transition to occupational therapy practice), there will be one additional course that will need to have teaching faculty assigned. However, as the *Enabling occupation across the life* course will be made up of content drawn from existing courses with time taken from these courses, the increased teaching load on faculty will be small.

8 UTQAP Process

The UTQAP pathway is summarized in the table below.

Steps	**Approvals**
Development/consultation within unit	
Consultation with Dean's office (and VPAP)	
	Unit-level approval as appropriate
	Faculty/divisional council
Submission to Provost's office	
Reported to the Provost and included in annual report to AP&P	
Ontario Quality Council—reported annually	

Appendix A: Current Calendar Copy

Occupational Science and Occupational Therapy

Faculty Affiliation

Medicine

Degree Programs

Occupational Therapy

MScOT

Collaborative Specializations

The following collaborative specialization is available to students in the participating degree program as listed below:

Women's Health

- Occupational Therapy, MScOT

Overview

The Department of Occupational Science and Occupational Therapy is committed to providing graduate and continuing education programs that enable occupational therapists to be leaders in research, clinical practice, and the promotion of health and well-being. Core and clinical faculty members provide dynamic, evidence-based, and comprehensive instruction and mentorship. Graduates are innovative professionals focused on enabling occupation and enhancing health and well-being.

Contact and Address

Web: http://ot.utoronto.ca
Email: ot.reception@utoronto.ca
Telephone: (416) 946-8571
Fax: (416) 946-8570

Department of Occupational Science and Occupational Therapy
University of Toronto
Room 160, 500 University Avenue
Toronto, Ontario M5G 1V7
Canada

Occupational Science and Occupational Therapy: Occupational Therapy MScOT

Master of Science in Occupational Therapy

Program Description

The MScOT program prepares students in advanced academic and professional knowledge and applied research skills for leadership in occupational therapy practice. The program emphasizes the application of theory and research evidence to clinical practice through rigorous studies in occupational therapy and research production and utilization.

Graduates are eligible to write the certification examination of the Canadian Association of Occupational Therapists, a requirement for registration with the College of Occupational Therapists of Ontario and most other professional regulatory colleges in Canada. Practice in another country generally requires the graduate to pass the licensing requirement specific to that country. Graduates are eligible to:

1. practise independently in a variety of roles, such as consultants and case managers, and in a range of settings, such as acute care, interdisciplinary programs, private practice, and primary health care;
2. supervise rehabilitation assistants, OT aides, or other support workers;
3. use principles of research-based practice to guide and evaluate service delivery;
4. contribute to research that will advance the knowledge base of the discipline;
5. assume management roles;
6. take leadership roles in the profession;
7. take leadership roles in health care and other sectors including social services, education, and labour;
8. fill academic-practitioner positions; and
9. pursue doctoral studies and careers in academia or clinical research.

The MScOT program is offered as a two-year full-time program and a one-year, advanced-standing part-time option.

MScOT Program (24-Month Full-Time)

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Occupational Science and Occupational Therapy's additional admission requirements stated below.
- An appropriate bachelor's degree from a recognized university with high academic standing and a mid-B average or better in the final year of study.
- To determine initial ranking only, the department will review the last 10.0 full-course equivalents (FCEs) completed at the undergraduate level by the application deadline.

- Apply online using the Ontario Rehabilitation Sciences Programs Application Service (ORPAS). Applications are accepted around October each year, with a deadline near the end of December or early January. Exact deadlines are posted on the ORPAS website and in the *ORPAS Instruction Booklet*.
- Applicants whose primary language is not English and who graduated from a university where the language of instruction is not English must provide proof of English proficiency by March 1 of the year of application. See General Regulations, section 4.3 English-Language Proficiency in this calendar for general information and acceptable tests. The department strongly prefers the Test of English as a Foreign Language (TOEFL) and requires a minimum score of:
  - 600 on the paper-based test, accompanied by a minimum score of 5 on the Test of Written English (TWE)
  - 100/120 on the Internet-based test with 22/30 on the speaking section and 22/30 on the writing section.

  TOEFL candidates should request that results be sent to institution code 0982.
- Visit the Occupational Therapy and ORPAS websites for additional information regarding application document submissions (e.g., confidential assessment forms, resumé, personal statement submission).

Program Requirements

- The MScOT is a two-year, 24-course (18.0-FCE) program of continuous, full-time study.
- Students begin their studies in September and complete six consecutive sessions, with a range of four to six concurrent courses in each session.
- There are four full-time block fieldwork components within the program of study.

Program Length

6 sessions (typical registration sequence: F/W/S/F/W/S)

Time Limit

3 years

MScOT Program (12-Month, Advanced-Standing Part-Time Option)

Minimum Admission Requirements

- Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Occupational Science and Occupational Therapy's additional admission requirements stated below.
- A bachelor's degree in occupational therapy from a recognized university with high academic standing and a mid-B average or better in the final year of study.
- Applicants must be registered, or eligible for registration, for independent practice as an occupational therapist in Canada with a provincial regulating body.

- Apply online using the SGS online application system. Applications are accepted approximately in mid-February each year, with a deadline approximately at the end of March (subject to change).
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  TOEFL candidates should request that results be sent to institution code 0982.
- Visit the Occupational Therapy website for additional information regarding application document submissions (e.g., reference letters, resumé, personal statement submission).

Program Requirements

- The advanced-standing option is a three-consecutive-session, part-time program of study beginning in September. Students must complete 3.5 full-course equivalents (FCEs).
- Students complete the advanced-standing option in an online environment with a mandatory one-week, on-campus residency.
- For more information about the application process, tuition, and supervision, etc., please visit the website.

Required Courses

OCT 1111Y	Occupational Science: Foundations for Occupational Therapy
OCT 1121H	Research Issues and Approaches in Occupational Therapy
OCT 1122H	Methods in Practice-Based Research
OCT 1220Y[0]	Graduate Research Project (1.5 FCEs)

[0] Course that may continue over a program. The course is graded when completed.

Program Length

3 sessions (typical registration sequence: F/W/S)

Time Limit

3 years

Occupational Science and Occupational Therapy: Occupational Therapy MScOT Courses

OCT 1100H[0]	Applied Skills and Technology: Human Factors and Design in Occupational Therapy
OCT 1111Y	Occupational Science: Foundations for Occupational Therapy
OCT 1121H	Research Issues and Approaches in Occupational Therapy
OCT 1122H	Methods in Practice-Based Research
OCT 1123H	Framing Practice-Based Research
OCT 1131H	Occupational Therapy Practice l
OCT 1132H	Occupational Therapy Practice ll
OCT 1133H	Occupational Therapy Practice lll
OCT 1141H	Assessment in Occupational Therapy
OCT 1152Y	Musculoskeletal Structure and Function
OCT 1162Y	Psychosocial Perspectives in Occupational Therapy
OCT 1172Y+	Neuro-motor/Neuro-cognitive Perspectives in Occupational Therapy
OCT 1183Y	Occupational Therapy Fieldwork l
OCT 1190Y[0]	Building Practice Through Mentorship
OCT 1220Y[0]	Graduate Research Project (1.5 FCEs)
OCT 1251H	Enabling Occupation with Children: Part I
OCT 1252H	Enabling Occupation with Children: Part II
OCT 1261H	Enabling Occupation with Adults: Part I
OCT 1262Y	Enabling Occupation with Adults: Part ll
OCT 1271H	Enabling Occupation with Older Adults: Part l
OCT 1272H	Enabling Occupation with Older Adults: Part II
OCT 1281Y	Occupational Therapy Fieldwork II
OCT 1282Y	Occupational Therapy Fieldwork III
OCT 1283Y	Occupational Therapy Fieldwork IV

[0] Course that may continue over a program. The course is graded when completed.

[+] Extended course. For academic reasons, coursework is extended into session following academic session in which course is offered.

Appendix B: Proposed Calendar Copy

Occupational Science and Occupational Therapy

Faculty Affiliation

Medicine

Degree Programs

Occupational Therapy

MScOT

Collaborative Specializations

The following collaborative specialization is available to students in the participating degree program as listed below:

- Women's Health

  Occupational Therapy, MScOT

Overview

The Department of Occupational Science and Occupational Therapy is committed to providing graduate and continuing education programs that enable occupational therapists to be leaders in research, clinical practice, and the promotion of health and well-being. Core and clinical faculty members provide dynamic, evidence-based, and comprehensive instruction and mentorship. Graduates are innovative professionals focused on enabling occupation and enhancing health and well-being.

Contact and Address

Web: http://ot.utoronto.ca
Email: ot.reception@utoronto.ca
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Fax: (416) 946-8570

Department of Occupational Science and Occupational Therapy
University of Toronto
Room 160, 500 University Avenue
Toronto, Ontario M5G 1V7
Canada

Occupational Science and Occupational Therapy: Occupational Therapy MScOT

Master of Science in Occupational Therapy

Program Description

The MScOT program prepares students in advanced academic and professional knowledge and applied research skills for leadership in occupational therapy practice. The program emphasizes the application of theory and research evidence to clinical practice through rigorous studies in occupational therapy and research production and utilization.

Graduates are eligible to write the certification examination of the Canadian Association of Occupational Therapists, a requirement for registration with the College of Occupational Therapists of Ontario and most other professional regulatory colleges in Canada. Practice in another country generally requires the graduate to pass the licensing requirement specific to that country. Graduates are eligible to:

1. practise independently in a variety of roles, such as consultants and case managers, and in a range of settings, such as acute care, interdisciplinary programs, private practice, and primary health care;
2. supervise rehabilitation assistants, OT aides, or other support workers;
3. use principles of research-based practice to guide and evaluate service delivery;
4. contribute to research that will advance the knowledge base of the discipline;
5. assume management roles;
6. take leadership roles in the profession;
7. take leadership roles in health care and other sectors including social services, education, and labour;
8. fill academic-practitioner positions; and
9. pursue doctoral studies and careers in academia or clinical research.

The MScOT program is offered as a two-year full-time program and a one-year, advanced-standing part-time option.

MScOT Program (24-Month Full-Time)

Minimum Admission Requirements

Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Occupational Science and Occupational Therapy's additional admission requirements stated below.
An appropriate bachelor's degree from a recognized university with high academic standing and a mid-B average or better in the final year of study.
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TOEFL candidates should request that results be sent to institution code 0982.
Visit the Occupational Therapy and ORPAS websites for additional information regarding application document submissions (e.g., confidential assessment forms, resumé, personal statement submission).

Program Requirements

The MScOT is a two-year, 24-course (18.5-FCE) program of continuous, full-time study. Students begin their studies in September and complete six consecutive sessions, with a range of four to six concurrent courses in each session.
There are four full-time block fieldwork components within the program of study.

Program Length

6 sessions (typical registration sequence: F/W/S/F/W/S)

Time Limit

3 years

Required Courses

Course Code	Course Title	FCE
OCT 1100H	Applied Skills and Technology: Human Factors and Design in Occupational Therapy	0.5
OCT 1111Y	Occupational Science: Foundations for Occupational Therapy	1.0
~~OCT1121H~~	~~Methods in Practice-Based Research~~	~~0.5~~
~~OCT1122H~~	~~Methods in Practice-Based Research~~	~~0.5~~
OCT 1122Y	Research Approaches and Methods in Occupational Therapy	1.0
~~OCT1123H~~	~~Framing Practice-Based Research~~	~~0.5~~
OCT 1131H	Occupational Therapy Practice I	0.5
OCT 1132H	Occupational Therapy Practice II	0.5
~~OCT 1133H~~	~~Occupational Therapy Practice III~~	~~0.5~~
OCT 1141H	Assessment in Occupational Therapy	0.5
OCT 1152Y	~~Musculoskeletal Structure and Function Perspectives in Occupational Therapy~~ Musculo-Skeletal Foundations for Occupational Therapy Practice	1.0
OCT 1162Y	~~Psychosocial Perspectives in Occupational Therapy~~ Mental Health Foundations for Occupational Therapy Practice	1.0
OCT 1172Y[+]	~~Neuro-motor /Neuro-cognitive Perspectives in Occupational Therapy~~ Neurological Foundations for Occupational Therapy Practice	1.0
OCT 1183Y	Occupational Therapy Fieldwork I	1.0
OCT 1190Y[0]	Building Practice Through Mentorship	1.0
OCT1193H	Enabling Occupation across the Life Course	0.5
OCT 1220Y[0]	Graduate Research Project (1.5 FCEs)	1.5
OCT1233H	Occupational Therapy Practice III	0.5
OCT 1236H	Transition to Occupational Therapy Practice	0.5
OCT 1251H	Enabling Occupation with Children: Part I	0.5
OCT 1252H	Enabling Occupation with Children: Part II	0.5
OCT 1261H	Enabling Occupation with Adults: Part I	0.5
OCT 1262Y	Enabling Occupation with Adults: Part II	1.0

OCT 1271H	Enabling Occupation with Older Adults: Part I	0.5
OCT 1272H	Enabling Occupation with Older Adults: Part II	0.5
OCT 1281Y	Occupational Therapy Fieldwork II	1.0
OCT 1282Y [+]	Occupational Therapy Fieldwork III	1.0
OCT 1283Y	Occupational Therapy Fieldwork IV	1.0

[0] Course that may continue over a program. The course is graded when completed.
[+] Extended course. For academic reasons, coursework is extended into session following academic session in which course is offered.

MScOT Program (12-Month, Advanced-Standing Part-Time Option)

Minimum Admission Requirements

Applicants are admitted under the General Regulations of the School of Graduate Studies. Applicants must also satisfy the Department of Occupational Science and Occupational Therapy's additional admission requirements stated below.
A bachelor's degree in occupational therapy from a recognized university with high academic standing and a mid-B average or better in the final year of study.
Applicants must be registered, or eligible for registration, for independent practice as an occupational therapist in Canada with a provincial regulating body.
Apply online using the SGS online application system. Applications are accepted approximately in mid-February each year, with a deadline approximately at the end of March (subject to change).
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- 100/120 on the Internet-based test with 22/30 on the speaking section and 22/30 on the writing section.

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Program Requirements

The advanced-standing option is a three-consecutive-session, part-time program of study beginning in September. Students must complete 3.5 full-course equivalents (FCEs). Students complete the advanced-standing option in an online environment with

a mandatory one-week, on-campus residency. For more information about the application process, tuition, and supervision, etc., please visit the website.

Required Courses

Course Code	Course Title	FCE
OCT 1111Y	Occupational Science: Foundations for Occupational Therapy	1.0
OCT 1122Y	Research Approaches and Methods in Occupational Therapy	1.0
OCT 1220Y[0]	Graduate Research Project	1.5

[0] *Course that may continue over a program. The course is graded when completed.*

Program Length

3 sessions (typical registration sequence: F/W/S)

Time Limit

3 years