INTRODUCTION

Overview of the new program

The Department of Surgery at Western has a large, well-established, and highly-regarded postgraduate surgical education training program that includes seven individual subspecialty programs. Potential residents and fellows in the Department of Surgery at Western compete for positions in seven postgraduate subspecialties: Cardiac Surgery, General Surgery, Orthopaedic Surgery, Plastic & Reconstructive Surgery, Urology, Vascular Surgery, and Thoracic Surgery. Residency training programs last five to seven years and typically include research periods of varying duration based on subspecialty requirements. All of the subspecialties received full Royal College accreditation at their last reviews, and have had a 100% pass rate for residents on their Royal College exams over the past seven years – an unparalleled record among surgical training programs in Canada where the average pass rate for surgical subspecialties ranges from 67.1% to 98.8%.

Clinical fellows have completed residency training and enroll in postgraduate surgical education training programs for one to two years and often have basic science and/or clinical research requirements as a part of their fellowship training. However, no additional degrees or diplomas are granted for research training periods and the trainees have not necessarily obtained the breadth or depth of tools necessary to achieve their academic goals before their research time has elapsed.

With a clinical background at one of the strongest surgical training programs in Canada, a Western MSc Degree will further enable a select number of advanced trainees to prepare for careers as surgeons and researchers at Academic Health Science Centres. This Degree will be attractive to mid-stream and graduating residents as well as clinical fellows wishing to pursue full-time, formal research training in a robust clinical academic environment. The structured experience will appropriately recognize and develop their research and research skills. Led by clinical and basic science faculty with significant success in research, students will participate in world-class research laboratories on innovative projects that seek to advance surgical care, education, and patient outcomes.

This proposed MSc in Surgery, within the Department of Surgery, differs from other academic degree programs as it specifically reflects the expectations and talents of surgical researchers. It also offers the flexibility to train in different aspects of clinical and basic science surgical research. Unlike current graduate programs available at Western, the MSc in Surgery will be tailored to physicians who have extensive post-graduate education including three or four years of undergraduate education, three or four years of medical school and two to five years of surgical training. These students are typically older than most MSc students at Western and normally have some prior experience with applying specific research methods. Their learning needs are focused on an academic surgical career and as such require further development of their research skills in identifying relevant research questions, matching appropriate research methodologies with questions and writing up research in the form of scientific papers and research grants.

The Department of Surgery at Western has approximately half of its faculty in the Senate Stream where research is a required component of their responsibilities. A number of faculty in the Department of Surgery at Western have conducted and published research that has changed clinical practice worldwide, including non-surgical treatment of achilles injuries; arthroscopic surgery in patients with moderate-to-severe osteoarthritis of the knee; transplantation; laparoscopic surgery; endovascular aortic repair; minimally invasive thoracic, urologic, and cardiac surgery; and upper extremity bioengineering. The MSc in Surgery would help prepare trainees for careers in academic surgery similar to the excellent role models in our existing faculty and will complement and further strengthen the relationship between the CIHR pillars of basic and clinical science. Surgeons who complete the Western MSc in Surgery will be able to compete favorably in an ever increasingly competitive job market and funding environment and will have the necessary instruments to succeed in their chosen academic surgical career.
Furthermore, this advanced degree opportunity will be beneficial for the recruitment of faculty, and in our relative academic standing among our Academic Health Science peers. The Department of Surgery has recruited many clinicians with Master's and Doctoral degrees in the last five years. These premier faculty recruits are attracted to a clinical academic program that offers an inherent graduate program within Surgery. The addition of students committed to this graduate degree will enhance our research productivity, which we hope will lead to further advancement in our ranking in tri-council grant achievements.

Course curriculum
The MSc in Surgery is a Category I research-based degree that will require completion of a minimum of 2.0 course credits and the successful completion and defense of an MSc thesis. The program is designed to focus primarily on bench research, with knowledge gained from course work and “hands-on” research culminating in a thesis and public oral exam. The candidates will be expected to complete two half courses for completion of the MSc in Surgery consisting of a) Principles of Advanced Surgical Research (1.0 credit) and b) Advanced Surgical Research Colloquium (1.0 credit). This program will typically be completed within one year (three terms) with objective measures of completion and success; however the final duration of the MSc program for each student will be at the discretion of the advisory committee and the graduate program committee pending suitable progress in the program (see section 4.2e). Students in a residency or fellowship training program will be relieved of clinical duties while enrolled full-time in the MSc program.

Principles of Advanced Surgical Research will be designed to afford the trainee basic skills and resources in evidence-based medicine, grant writing, research ethics, research methodology and design, principles of clinical trials, and statistics. This mandatory course will take advantage of existing skills within the faculty in developing a strong research background for trainees. For ease of administration, all core courses will be administered on Monday afternoons using existing in-hospital seminar rooms and will consist of weekly seminar sessions of approximately two-hour duration.

The Principles of Advanced Surgical Research course will include seminars taught primarily by a small group of Primary and Supporting members of the Graduate Program Committee (Table 1). The seminars will be assessed continually by the Graduate Program Chair and Associate Chair during and between each term, allowing uniformity and stability in quality and content between seminars and terms. This course will offer an intense period of research instruction for the MSc students. This is consistent with the expectations of an academic surgeon and in itself will help prepare these students for their chosen career. In addition, the protection from clinical responsibilities will allow the students to commit their entire efforts and attention to successful completion of the program.

All candidates will be required to submit an appropriate thesis and to defend their thesis in an examination format, as per the current guidelines of the School of Graduate and Postdoctoral Studies (SGPS). The thesis format will typically follow the manuscript style of the University, with the expectation that a minimum of one complete, publication-quality, peer-reviewed manuscript will compose the body of the thesis. The student will be expected to be first author of this paper. An appropriate introduction and conclusion to provide background to the manuscript and to place the work in a relevant context will complete the thesis, as per the University guidelines.

Core Curriculum: Principles of Advanced Surgical Research, 1.0 Credit
Curriculum Topics
1. Evidence Based Medicine – A primer
2. Grant Writing – identifying sources of funding, hypothesis development reviewing grant summaries leading to the candidate preparing their own grant summary (assignment), i.e., equivalent to an 11-page CIHR submission
3. Research Ethics 1 – background and assignment of a IRB application
4. Research Ethics 2 – reviewing IRB applications
5. Research Methodology – statistical methods for data comparison, power analysis and sample size calculation
6. Clinical Trials 1 – single-centre studies and chart reviews
7. Clinical Trials 2 – conduct of multi-centre studies (including DSMB roles)
8. Effective Presentations – prepare and present a 6-minute research lecture
9. Written Communications 1 – An effective abstract
10. Written Communications 2 – Materials and methods
11. Written Communications 3 – Results and discussion
12. Assignment 5: research paper development
13. Principles of Educational Research 1
15. Commercialization, Patents, and Intellectual Property

Core Curriculum: Advanced Surgical Research Colloquium, 1.0 Credit
Ten lectures alternating between the surgical divisions and their respective research teams will expose candidates to the range of research and methodologies in the Department of Surgery. Candidates will present their research findings in one hour seminars to provide experience with long presentations as well as with question and answer periods.

In some instances, a student’s advisory committee may also recommend strongly that a student enroll in or audit a graduate course in another Department to ensure sufficient skills and background to complete the program.

Goals and Objectives of the program in relation to the Graduate Degree Level Expectations
a) Overall Objectives
The MSc in Surgery is intended to prepare trainees with intensive research experience, leading them to success in future academic surgical careers where they hold academic appointments at university affiliated Academic Health Science Centres and are actively involved in research and education. Students in a residency or fellowship will be relieved from clinical duties to enroll in the MSc program.

b) Depth and Breadth of Knowledge
The MSc in Surgery will provide a core understanding of research methodology, and the foundation required for subspecialty-related research in areas of surgical care, education, and patient outcomes. The research methodology course is specific to the needs of academic surgeons as they begin their career in academic medicine. By providing specific, targeted training, surgeons can help their trainees start their career with the appropriate tools to navigate grant committees, ethics boards, and journals with the ultimate goal of producing advanced research contributions. All candidates will be expected to develop advanced knowledge of a variety of relevant research techniques and applications, as well as developing specific knowledge relevant to their area of study and thesis.

c) Research and Scholarship
The MSc in Surgery will require the completion of a minimum of 2.0 core course credits which will include the courses noted above and a thesis. For successful completion of the thesis, a minimum of one publishable, peer-reviewed quality manuscript will form the body of the thesis where it is expected that the student will be the first author. As well, all MSc candidates are expected to prepare one complete grant application and one complete hospital / institutional IRB application as part of the Principles of Advanced Surgical Research course curriculum (Section 1.2e).

d) Core Competencies
The MSc in Surgery will develop core competencies in surgical research, including:

- Evidence Based Medicine
- Grant Writing
- Experimental Design
- Data Analysis
- Research Ethics
- Research Methodology (Quantitative and Qualitative)
- Clinical Trials
- Effective Presentations
- Written Communications
- Principles of Educational Research
e) Level of Application of Knowledge
The courses will be taught at the graduate level only and require students to have had some exposure to research in their undergraduate and postgraduate education. As students must have completed a minimum of two years of residency, they will be expected to have achieved core competency in surgical care and possess an understanding of how these relate to their area of research being pursued as a part of the MSc program. Following completion of this MSc in Surgery, the student will be capable of conducting surgical research and teaching these principles to surgical residents and fellows. They will also be capable of subsequent research and graduate student supervision.

f) Professional Capacity / Autonomy
All trainees now follow the CanMEDS roles embodied by competent physicians: Medical Expert (the central Role), Communicator, Collaborator, Health Advocate, Manager, Scholar and Professional. The MSc in Surgery will enhance the competency of trainees specifically in the areas of Medical Expert and Scholar. Although students will work closely with their supervisors, it is expected that they will undertake independent scholarly research and at the end of their training have a solid basis of technical knowledge and research application.

g) Level of Communication Skills
Our curriculum includes a Principles of Advanced Surgical Research course which provides formal training in writing scientific abstracts, preparing scholarship applications and research grant proposals, and making both oral and written presentations. Communication will be assessed as part of the core curriculum of the Principles of Advanced Surgical Research course, the seminar course, and in the completion of the students’ final (oral) Thesis presentation.

h) Awareness of Limits of Knowledge
Students will be exposed to the complexities of Basic, Clinical and Educational research in Surgery, and its role in helping deliver multi-disciplinary healthcare through several avenues: (i) their Clinical work, which will provide a context for the research in society, (ii) attending clinical rounds and (iii) attending the core graduate student seminars. (See Section 3 / Professional Development Resources for more details.)

PROGRAM REGULATIONS AND COURSES
The Intellectual Development and the Educational Experience of the Student

a) Departmental Seminars
One of the most important training tools is our Principles of Advanced Surgical Research core seminar. Graduate student presentations are anticipated to be of exceptional quality, with faculty setting the standard for students to follow. To encourage attendance and to demonstrate our commitment to all of our students, the site of the seminars will rotate between the affiliated hospitals. The seminar series also acts to strengthen links between students and faculty at different institutes. Collaborations among members of different fields have been established based on the graduate student seminars. All core courses will be administered on Monday afternoons using existing in-hospital seminar rooms and will consist of weekly seminar sessions of approximately 2 hour duration.

Attendance at the Department of Surgery Research Day (full day, annual event), Department of Surgery Grand Rounds (1.5 hours, annual event), and Divisional Grand Rounds (1.5 hours, monthly event), will be required of all graduate students.

b) Guest Speakers
See Section 1.1 (e) Core curriculum and Section 3.6 Professional development resources

c) Management Lectures / Courses
See Section 1.1 (e) Core Curriculum

d) Conferences
Students will have opportunities to attend scientific conferences, as part of the training. The faculty supervisor pays for conference attendance costs from grants. In general, conferences help students gain perspective on their training in comparison to the national or international research community, and it introduces the students to leaders in their field of expertise. The excellent performance of our students at
these conferences helps to promote the reputation of our program and makes it easier for our graduates to find employment in their desired careers.

Program Regulations

a) Admission

Recruitment Methods: Recruitment of students will be through internal and external advertising. This includes existing Divisional mechanisms (web, conferences, etc.). Information will be available on the Department of Surgery website.

Application: The program will follow the application standards set by the School of Graduate and Postdoctoral Studies (SGPS). In addition to submitting the online application form and arranging for two letters of reference and for transcripts of the academic record as required by the School of Graduate and Postdoctoral Studies, candidates must provide a research proposal for their surgical subspecialty area and have identified a supervisor for their research. Candidates must be recommended by the Division Chair/Chief as well as the potential supervisor. Candidates short-listed for the program will be invited for an interview. Applications will be assessed by the Graduate Program Committee in the Department of Surgery who will make the final decision for admission. Since the first two years of surgical subspecialty program require intensive clinical skills training, students will not be considered for the MSc in Surgery until they are entering their third postgraduate year (PGY3) and may apply for the program in any subsequent year of subspecialty training (residency or fellowship).

Application Deadlines: Applications will be accepted at any time; however it is expected that students will typically apply in the spring/summer (by May 31st) in order to receive an offer early summer, to begin course work in September.

Offer Timelines: Applicants can expect offers at latest by July 1st.; however a start date for course work and their research period will be at the discretion of the supervisor and Graduate Program Committee.

Requirements for Admission: To be admitted a student must have:
An undergraduate degree with a minimum average of 78% over the last two years of an Honours Program (completed prior to enrolment in an MD program);
Successfully completed the MD degree or equivalent (this degree is pass/fail);
Completed a minimum of two years of a surgical residency program (students may apply at any point in residency or fellowship training thereafter); and
Demonstrate an aptitude for and interest in surgical research

Grade Requirements for Funding Eligibility: Continued tuition scholarship funding in the MSc program will require students to maintain a minimum average of 80% in all course work.

b) Program Requirements

Course Requirements: Students will be required to complete a total of two 1.0 credit core courses; and successful completion of a thesis. Please see section 1.1 (e) for additional information on the core course curriculum.

Milestones: The Candidate will be assessed throughout the core curriculum on course requirements including presentations; written reports (including sample grant submissions); and in-class contributions. Students will be supported by an advisory committee consisting of at least three faculty members, which will meet at a minimum every three months. During thesis preparation, students will work closely with their supervisor(s) to ensure adequate progress leading to thesis submission and a formal (oral) defense.
Internship or Practica: No internship or practica will be required as this is a research-based Degree intended to complement existing clinical training.

c) Language Requirements

Language skills, particularly for foreign students, are essential to an appropriate training and supervision experience. Students for whom English is a second language are required to provide proof of English proficiency. All such candidates will be interviewed by faculty members, by video conference when necessary, during which sufficient English language skills must be demonstrated.
d) Progression Requirements
Students must achieve a minimum of 80% in course work to maintain enrolment in the program. Students must continue to meet objectives for thesis progression set by their supervisor and advisory committee in order to maintain enrolment in the program.

Normal completion of the MSc in Surgery will be in 12 months (3 terms) while enrolled full-time. However each student’s progress will be closely monitored by his/her advisory committee and the final duration of the MSc program for each student will be at the discretion of the advisory committee and the graduate program committee pending suitable progress in the program.

Students in a residency training program will be expected to have a minimum of six-months of dedicated research time (two 13-week terms as a full-time Master’s student) within postgraduate years three and four to complete all course work and bench research leading to the preparation of the thesis. Students in residency and fellowship training programs will be excused from clinical duties while maintaining full-time enrolment in the MSc program.

Part-time enrolment in the program is permitted to a maximum of four years or completion of their surgical subspecialty training program with the permission of the student’s supervisor and the Graduate Program Committee.

e) Process for Evaluating Progress in the Program / Progress Reports
Performance in individual courses is assessed by course instructors. Thesis progress will be assessed by the supervisor and the advisory committee. An advisory committee will have a minimum of three members, which will include an individual from the Graduate Program Committee in the Department of Surgery.

f) Thesis Evaluation Procedures
The student will be required to defend their thesis orally by a committee which includes external examiners, as per SGPS guidelines for an MSc thesis defense. It is expected that the thesis will lead to the publication of a minimum of one peer-reviewed journal article as first-author.

g) Part-time Studies
The MSc in Surgery is available for part-time studies only with the permission of the student’s supervisor and the Graduate Program Committee. Students enrolled part-time will continue to participate in research symposia, grand rounds, and other educational opportunities related to the MSc program. The MSc must be completed within four years.
Final Assessment Report
Submitted by SUPR-G to SCAPA

Program: Surgery

| Degrees Offered: | MSc |
| Approved Fields: | N/A |
| Date of Site Visit: | July 23-24, 2012 |
| Evaluation: | Approved to commence with report in one year following first intake |

Summary: The Master of Surgery program will be a new research-based master’s program, embracing a broad range of research foci and applications within the discipline of surgery, open to surgical residents and fellows. The program will prepare its graduates for careers as academic surgeon-researchers. The report of the External Consultants notes that a number of the surgeons proposed as members of the new program are experienced “surgeon-scientists” “more than capable of being strong research supervisors and mentors for MSc students.” Support from Western Libraries and the libraries at London Health Sciences and St. Joseph’s Hospital is excellent and administrative support and support for students within the Department of Surgery is adequate. Admission requirements for the program are appropriate. On the recommendation of the External Consultants, several revisions were made to the initial program proposal; these include the requirement of a proposal as part of the application for admission, the requirement of a research proposal by the end of the first term of study, and the completion of two full courses: the “Principles” course (including coverage of qualitative research, basic research, and commercialization and intellectual property, including patents) and the “Seminar Colloquium” course. To address the needs of those surgical residents for whom full-time studies would not be feasible, the External Consultants recommended that the program identify two alternate pathways, one for part-time and one for full-time. In addition, it was recommended that an elective course be required of all students in the program. This elective course, if taken in another graduate program, may provide an opportunity for collaboration with other disciplines of the kind encouraged by, and consistent with, the role of Collaborator defined within the CanMEDS medical education framework and will also foster interaction of this graduate program with other graduate programs at Western, as recommended by the Consultants. While Surgery has good relationships within its own Faculty (e.g., with Epidemiology), and with Engineering, and has included, as supporting graduate faculty member for Surgery, a scholar appointed to the School of Physical Therapy, further collaboration with a wider range of graduate programs, such as Nursing, Health and Rehabilitation Sciences, Psychology, Communication Sciences and Disorders, Occupational Therapy, and Law, may be achieved in part through encouraging students to enroll in elective courses offered in other graduate programs.

Recommendation | Responsibility
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Define two alternative degree-completion pathways: one full-time one-year program (for fellows or residents), and one part-time two-year program with minimum 6-month full-time research block (for residents only). | Graduate Program Committee
Require a final Research Proposal by the end of the first term in the program, to be approved by the advisory committee. | Graduate Program Chair
In addition to the two full core courses, require each student to take one elective (for students admitted without a previous research methods course, the elective should be in this area). | Supervisor
Develop relationships with other graduate programs across campus. | Graduate Program Committee, Supervisors
Implement a monitoring process for the more senior researchers to mentor the more junior researchers in the supervision of graduate students. | Graduate Program Committee
Conduct exit interviews and track publications and careers at 5- and 10-year marks. | Graduate Program Chair