FACULTY OF DENTISTRY

Self-Study 2016

Commissioned by the Provost in 2016 as part of the
University of Toronto Quality Assurance Process (UTQAP)

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UNIVERSITY OF TORONTO
FACULTY OF DENTISTRY

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1. INTRODUCTION AND CONTEXT

Overview

The Faculty of Dentistry of the University of Toronto was founded as the School of Dentistry by the Royal College of Dental Surgeons in 1875, and was the first dental school in Canada. Seven years earlier, in 1868, the College had been given the dual responsibilities of licensing and dental education when the Province of Ontario, in one of its first legislative actions, passed the "Act Respecting Dentistry".

The School began its affiliation with the University of Toronto in 1888 when it established the degree of Doctor of Dental Surgery (D.D.S.). It was not until 1925, however, that the Royal College of Dental Surgeons formally relinquished its teaching function in order to permit the School to become a Faculty of the University of Toronto. At that time the College agreed that the University should conduct all examinations and forward to the College annually the list of those candidates for the Ontario license who had met the conditions prescribed for the degree of Doctor of Dental Surgery.

Its program for the Doctor of Dental Surgery (D.D.S.) degree is the largest in Canada (www.dentistry.utoronto.ca/students/doctor-dental-surgery-dds). This 4-year program currently graduates approximately 120 qualified students each year from its undergraduate D.D.S. program. These students are eligible to become registered as licensed dentists in Canada following successful completion of assessments conducted by the National Dental Examining Board of Canada (NDEB). The Faculty of Dentistry has the largest Qualifying Program for international dentists in Canada, in its International Dentist Advanced Placement Program (IDAPP). This 6-month program currently enrolls 24 internationally-trained dentists yearly, all of whom are Canadian citizens or permanent residents. The Faculty of Dentistry currently has approximately 430 undergraduate students.

Its Graduate Department (www.dentistry.utoronto.ca/graduate-studies) offers doctoral stream Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.) degree programs, either with or without concurrent clinical training in a dental specialty. In that latter role, the Faculty educates specialists in all 10 dental specialties recognized in the province of Ontario. These include: Dental Anaesthesia, Dental Public Health, Endodontics, Oral and Maxillofacial Radiology, Oral and Maxillofacial Surgery, Oral Medicine and Oral Pathology, Orthodontics, Pediatric Dentistry, Periodontology, and Prosthodontics. It is the only dental school in Canada to educate specialists in all recognized specialties, and the only one to have programs in Dental Anaesthesia, Dental Public Health, and Oral and Maxillofacial Radiology. It provides the potential for future academics for dentistry to universities across Canada through its M.Sc. and Ph.D. programs. The Faculty of Dentistry currently has approximately 130 graduate students.

In addition to its teaching function, the Faculty of Dentistry has a major commitment to dental research. The Faculty has a long tradition of research and is considered a major dental research centre, not only in Canada, but also internationally. Among the U15 universities in Canada, the Thompson-Reuters data show that it ranks number one in publications and number one in citations in the field of Dentistry, Oral Surgery and Medicine. When compared with the public universities in the Association of American Universities (AAU), it ranks fifth in publications and seventh in citations.

Areas of research strength and future growth in the Faculty include multidisciplinary approaches in the fields of biomaterials, connective and mineralized tissue biology, dental public health, education research, microbiology, oral pathology and cancer, pain and neuroscience, and wound healing. Each year, with the support of the Canadian Institutes of Health Research, a limited number of research scholarships are available to enable students to work through the summer months in the research laboratories. Students awarded such scholarships report the results of their work at research seminars.

The Faculty also provides direct service to the community, as part of its mission and clinical education role. This makes it unique among Faculties in the university. The Faculty is the largest dental clinic in Canada, with 293 dental chairs. It has 15,000 active patients and records 78,000 patient visits annually. Service learning also takes place through outreach clinics which currently include those at St. Michael's Hospital, the Centre for Addiction and Mental Health, as well as globally. Electives in Ethiopia and Uganda have commenced, with plans for new ones in the near future.

The Faculty has relationships with a number of the University of Toronto affiliated teaching hospitals (part of the Toronto Academic Health Sciences Network (TAHSN)). Specifically, The Hospital for Sick Children, Mt. Sinai Hospital, Sunnybrook Health Sciences Centre, Princess Margaret Hospital, Holland Bloorview Kids Rehabilitation Hospital and Weeneebayko General Hospital (Moose Factory) have our students take part in clinical rotations at their sites.

The Faculty offers training to permit licensure in Canada for international dentists and dental specialists through its International Dentist Advanced Placement Program (IDAPP) and its Dental Specialty Assessment and Training Program (DSATP). These are described within the section on Internal and External Relationships, and are the largest such programs in Canada.

The Faculty also has an active Continuing Dental Education program. As described within the section on Internal and External Relationships, this program provides a broad range of courses for the dental community that is accessed by practitioners as part of their continued competency.

The Faculty of Dentistry is the lead Faculty in the University of Toronto Centre for the Study of Pain (UTCSP). The UTCSP is an EDU-C, which is an Extra-Departmental Unit of the University of Toronto that is a multidisciplinary, multi-departmental, research and educational unit designed to foster research and scholarly interest in the area of pain. It was founded in 2000 to establish a comprehensive and coordinated network of research and education on pain at the University of Toronto. The Faculty of Dentistry has been the lead Faculty since its inception, spearheading a collaborative partnership between the Faculties of Dentistry, Pharmacy, Nursing, and Medicine. The UTCSP engages a diverse membership of approximately 180 faculty, trainee, and associate members and provides support to a broad array of research and education activities and an updated website for knowledge translation activity. A number of Faculty of Dentistry faculty are members of the UTCSP. Its director, Professor Bonnie Stevens, is cross-appointed with our Faculty, as was the inaugural director, Professor Michael Salter. The vision of the UTCSP is to be a key academic voice and a leader in interprofessional pain research, education, and knowledge

translation that will ultimately prevent or mitigate pain and suffering and improve pain outcomes for individuals across the lifespan.

The Faculty of Dentistry is one of three partners, along with the Faculty of Applied Science and Engineering and the Faculty of Medicine, of the University of Toronto's Institute of Biomaterials and Biomedical Engineering (IBBME). The IBBME is an EDU-A, which is similar to an EDU-C with respect to its multidisciplinary composition, but it can also hold primary academic appointments, offer degree programs, and administer research funds. The IBBME is an internationally recognized unique interdisciplinary and collaborative research unit which pursues research in four theme areas: neural, sensory systems and rehabilitation engineering; biomaterials, tissue engineering and regenerative medicine; molecular imaging and biomedical nanotechnology; and medical devices and clinical technologies. The Institute currently awards graduate students degrees through its Biomedical Engineering concentration (MASc, PhD Biomedical Engineering, PhD Biomedical Engineering - Clinical Engineering Concentration) and its Clinical Engineering MHSc program. Undergraduate courses are also offered through the Division of Engineering Science as part of its Biomedical Systems Engineering Option. It offers programs for 300 students who receive training in biomedical and clinical engineering from over 100 faculty members. A number of Faculty of Dentistry faculty members are cross-appointed to IBBME. Its director from 2008 to 2013 was Professor Paul Santerre, who is appointed with our Faculty.

Strengths and Challenges

As a national and international leader in academic dentistry, the Faculty seeks to continually build on its strengths in research, teaching, and clinical practice. A number of self-assessments have been done to improve our programs and services over the past few years. A comprehensive strategic planning process was launched in 2013 resulting in the 2014-19 Strategic Plan, *Achieving Impact through Excellence*. This is included as one of the Appendices, along with the Progress Reports for the first 2 years of the plan. This process identified a number of strengths and weaknesses that led to its goals and recommendations. Following this, we undertook a number of self-initiated external reviews. There have been external reviews of our Research program (April 2015) and our programs in Prosthodontics (June 2013) and Pediatric Dentistry (February 2016). We also had external reviews of administrative units including Information Technology, Media Services (which led to a merger of these 2 units into our Information and Instructional Technology Services unit), Advancement, Human Resources, and a review for our Registrar's office and student services is scheduled for October. These external reviews provide valuable information for us to strengthen our academic and administrative responsibilities.

The Faculty of Dentistry does face significant challenges ahead. As described in the section on Organizational and Financial Structure, we have been making efforts to reduce expenses and strengthen our resources. We have reorganized the academic administration model in order to better lead these and other efforts.

Recruitment of academics into clinical streams has historically been very challenging. This is a finding shared by others, where recent data show that there are over 250 openings for full time academics in dental schools in North America (Journal of Dental Education 2016 80:1012-1022). We have been very fortunate to recruit highly qualified academics into our clinical positions in a highly competitive field. Yet, sustaining this success is a challenge we must face. Our reputation of strength as an institution of excellence in research and teaching will continue to serve us well in this regard.

Improved alumni engagement is a key area of critical growth for the Faculty. We are making efforts to address this through activity by our Alumni Relations office, and taking measures to improve the experience of our current students while in our D.D.S. and graduate programs. In addition, we have recently retained a new Director of Advancement to provide new leadership in the area of alumni affairs.

Finally, increased competition for shrinking research dollars has become a reality for most Canadian universities. While we are substantially investing in our research infrastructure and human resources capacity, managing the Faculty's research enterprise remains a challenge in the foreseeable future years.

Self-Study Process

The Vice-President and Provost commissioned this Self-Study as part of the University of Toronto's Quality Assurance Program. To implement the preparation of the document, the Dean called upon selected faculty and administrative staff to lead the creation of specific sections of the report. The Vice Deans, Associate Deans, and Assistant Deans all participated and reviewed the document. The specialty program directors prepared reports for their respective programs. The following members contributed to the preparation of this Self-Study:

- Professor Bernhard Ganss, Vice Dean Research
- Professor Jim Yuan Lai, Vice Dean Education
- Professor Grace Bradley, Associate Dean Undergraduate Education
- Professor Ernest Lam, Associate Dean Graduate Education
- Mary Choi, Assistant Dean Administration
- James Posluns, Assistant Dean Clinics
- Robert Carroll, Assistant Dean Continuing Dental Education
- Margaret Edghill, Faculty Registrar
- Selina Esteves, Director of Advancement
- Helen He, Faculty Librarian

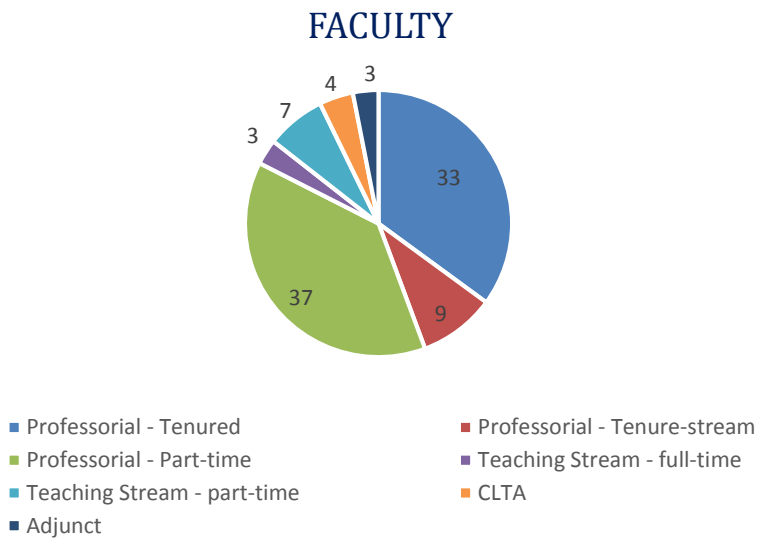
In early September 2016, all faculty and staff, as well as the student leadership, were sent a draft report for their review. All were then invited to consultation sessions held later in September. Feedback from these sessions was then taken into account in the preparation of the final report.

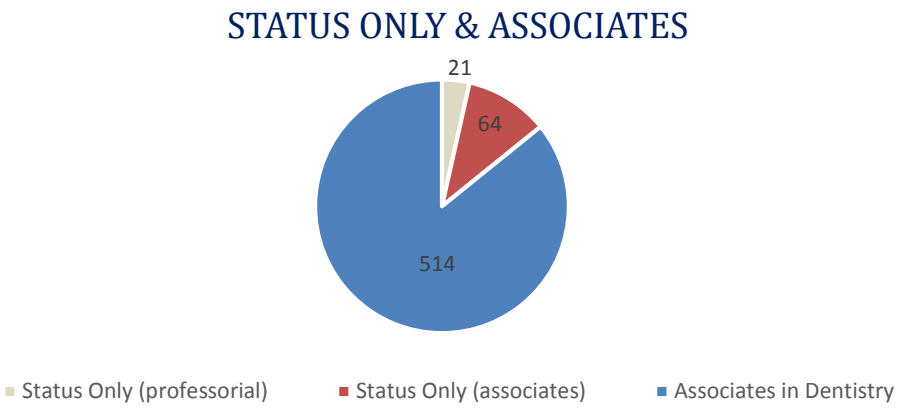
2. FACULTY

Overview

The Faculty has a total complement of 70.21 Full Time Equivalents (FTE) for 2016-17. This is comprised of 48 full-time faculty in the professorial stream, of whom 33 are tenured, 9 are in the tenure stream, 2 are in the professorial teaching stream, and 4 are on Contractually Limited Term Appointments. There is one full-time Senior Tutor and 7 part-time faculty in the teaching stream. There are 3 Adjunct Professors. There are 21 status-only professors. As well, there are 514 Associates in Dentistry who are clinical instructors and laboratory demonstrators. There has been a decrease in faculty numbers over the past 5 years (there were 73.6 FTE in 2011-12). This has been effectively managed while also increasing D.D.S. enrolment, in an effort to partially address the Faculty's financial challenges.

Table 2.1: Faculty Complement





The full-time faculty complement*, by name and rank, for 2016-17 is as follows:

SURNAME	FIRST NAME	RANK	FTE
Bradley	Grace	Professor - Tenured	100
Cvitkovitch	Dennis	Professor - Tenured	100
Davies	John	Professor - Tenured	51
Deporter	Douglas	Professor - Tenured	100
El-Mowafy	Omar	Professor - Tenured	100
Friedman	Shimon	Professor - Tenured	100
Ganss	Bernhard	Professor - Tenured	100
Glogauer	Michael	Professor - Tenured	100
Haas	Daniel	Professor - Tenured	100
Hinz	J. Boris	Professor - Tenured	100
Kishen	Anil	Professor - Tenured	100
Lam	Ernest	Professor - Tenured	100
Manolson	Morris	Professor - Tenured	100
McCulloch	Christopher	Professor - Tenured	100
Santerre	Paul	Professor - Tenured	51
Seltzer	Ze'ev	Professor - Tenured	66.6
Sessle	Barry	Professor - Tenured	60
Sigal	Michael	Professor - Tenured	100
Tenenbaum	Howard	Professor - Tenured	100
Azarpazhooh	Amir	Associate Professor - Tenured	100
Basrani	Bettina	Associate Professor - Tenured	100
Birek	Peter	Associate Professor - Tenured	100
Dao	Thuan	Associate Professor - Tenured	25

Dempster	Laura	Associate Professor - Tenured	100
Finer	Yoav	Associate Professor - Tenured	100
Gong	Siew-Ging	Associate Professor - Tenured	100
Kulkarni	Gajanan	Associate Professor - Tenured	100
Lawrence	Herenia	Associate Professor - Tenured	100
Levesque	Celine	Associate Professor - Tenured	100
Nainar	Hashim	Associate Professor - Tenured	100
Prakki	Anuradha	Associate Professor - Tenured	100
Quiñonez	Carlos R.	Associate Professor - Tenured	100
Suri	Sunjay	Associate Professor - Tenured	100
Yarascavitch	Carilynne	Assistant Professor (conditional)	100
Avivi-Arber	Limor	Assistant Professor – Tenure Stream	100
Carneiro	Karina	Assistant Professor – Tenure Stream	100
Cioffi	Iacopo	Assistant Professor – Tenure Stream	100
De Souza	Grace M	Assistant Professor – Tenure Stream	100
Lam	David	Assistant Professor – Tenure Stream	100
Magalhaes	Marco	Assistant Professor – Tenure Stream	100
Moayedi	Massieh	Assistant Professor – Tenure Stream	100
Moriarty	Tara	Assistant Professor – Tenure Stream	100

**Full-time faculty include those with budgetary cross-appointments, and those with reduced commitments due to phased retirement*

The part-time faculty complement, by name and rank, for 2016-17 is as follows:

SURNAME	**FIRST NAME**	**RANK**	
Andrews	Paul	Assistant Professor	40
Arat	Emel	Assistant Professor	50
Barlow	William (Ross)	Assistant Professor	50
Canton	Ester	Assistant Professor	50
Cherkas	Pavel	Assistant Professor	60
Chugh	Deepika	Assistant Professor	75
Chvartszaid	David	Assistant Professor	75
Cornell	David	Assistant Professor	75
Daskalogiannakis	I. John	Assistant Professor	25
Diwan	Randa	Assistant Professor	76
Goldberg	Michael	Assistant Professor	70
Husain	Shaheen	Assistant Professor	50
Ito	Dick	Assistant Professor	30
Katsikeris	Nikolaos	Assistant Professor	60

Kestenberg	S. Hartley	Assistant Professor	50
Laing	Leslie	Assistant Professor	50
Lanca	A. Jose	Assistant Professor	50
Leong	Iona	Assistant Professor	50
MacMillan	Roxanna	Assistant Professor	50
Malkhassian	Gevik	Assistant Professor	50
Mendes	Vanessa C	Assistant Professor	60
Metaxas	Angelos	Assistant Professor	25
Nkansah	Peter	Assistant Professor	25
Ouanounou	Aviv	Assistant Professor	40
Perschbacher	Susanne	Assistant Professor	50
Powell	David	Assistant Professor	40
Riches	Romanita	Assistant Professor	75
Rukavina	Julia	Assistant Professor	50
Sectakof	Pavel	Assistant Professor	20
Senadheera	Dilani	Assistant Professor	75
Sharma	Khushee	Assistant Professor	50
Shokati	Babak	Assistant Professor	40
Tam	Laura	Professor	60
Tenn-Lyn	Nicole	Assistant Professor	20
Voronov	Irina	Assistant Professor	75
Wilson	William	Associate Professor	50
Wong	Michelle	Assistant Professor	40

The full-time teaching stream faculty are as follows:

Hennyey	Donna	Senior Tutor	100
Lai	Jim Yuan	Assistant Professor, Teaching Stream	100
Somogyi-Ganss	Eszter	Assistant Professor, Teaching Stream	100

Those with contractually-limited term appointments are as follows:

Burgess	Karen	Assistant Professor	100
El-Badrawy	Wafa	Associate Professor	100
Holmes	Howard	Assistant Professor	100
Rayman	Richard	Assistant Professor	100

Strengths

The Faculty is fortunate in a number of ways. We have a complement of academics with strengths in research and strengths in education. Our faculty members have won numerous awards and honours (see Appendix 4). In spite of the challenges listed below, we have been able to continue to recruit junior faculty with excellent potential, and there is no doubt our future is bright.

Diversity and equity are fundamental values at the University of Toronto, and we are strongly committed to ensuring principles of inclusivity are incorporated into our academic hiring practices. Since 2010 there have been 12 new faculty appointments of full-time professorial stream academics, 6 of whom are female and 6 of whom are visible minorities. Diversity is also reflected in the senior academic administration, as 4 of the 6 Vice-Deans, Associate Deans and Assistant Deans, are visible minorities. This represents a significant shift in our leadership to better reflect the diversity of both the students in our classrooms and patients in our clinics.

Challenges

A major challenge has been attracting academic clinical specialists with both teaching and research experience, such that they are likely to meet the tenure requirements of the University. This is not unique to our dental school. There is a general shortage of faculty in dental schools in North America. Although the number of vacant faculty positions has improved since its peak 10 years ago, data obtained from the American Dental Education Association (ADEA) show that there were 252 vacant full-time faculty positions, and another 96 vacant part-time faculty positions, in U.S. schools alone in the academic year 2014-15 (Journal of Dental Education 2016 80:1012-1022).

One challenge for our own Faculty is the lack of a clinical professor stream, something that was pointed out in the 2011 external review (see Appendix 5). This takes the form of a non-tenured clinical professorial stream that allows the recruitment of well-qualified academic clinicians to provide clinical teaching and role modeling for students, in both the undergraduate and graduate programs. Unfortunately, only the Faculty of Medicine at the University of Toronto has such a stream, and the university has not made it available to other Faculties. Yet, such a stream would be very appropriate for the Faculty of Dentistry.

In June 2015, however, a new academic appointment stream was approved at the University of Toronto, which was a professorial rank for Teaching Stream. This would allow full-time faculty to become “Assistant Professor, Teaching Stream”, with the potential for promotion to “Associate Professor, Teaching Stream”, and “Professor, Teaching Stream”. These faculty would focus their work on teaching, yet still be involved in scholarly activity. They would differ from tenure-stream faculty in the distribution of time devoted to scholarly activity compared with teaching.

The introduction of this new stream could act to accomplish much of what a clinical track would have achieved. In both cases, the focus is on teaching. In our Faculty's case, it happens to be clinical teaching. Thus, our long-term plan is to recruit faculty into this stream to help strengthen our teaching mission. This effort has recently started. In July 2016, 2 new Assistant Professors, Teaching Stream faculty were appointed, and we hope to continue to gradually increase this cohort in the future.

Another challenge has been to optimize the working experience for our faculty. The University of Toronto carried out its "Speaking Up" survey in the fall of 2014 for faculty and staff to help determine their work experience. It was aimed to specifically gauge perception of areas such as recognition and respect, career development, leadership, resources, community, communication and work-life fit. The results for Dentistry showed that, whereas the faculty fared well overall, there were areas for improvement. The data were helpful to guide us for improvements. Communication was identified as being weak, a finding also noted in our Strategic Planning process, and we created a new position of Communications Officer, who began in January 2015. The ability to attain research funding was noted to be a source of stress for faculty. We created a position of Research and Business Development Officer to help faculty members achieve grant and research goals, and support faculty development and commercialization. We have also begun more active mentoring of our junior faculty, as all tenure stream faculty members now have a senior faculty mentor assigned to them to help guide them to prepare for tenure.

Faculty Development

The importance of faculty development was recognized in our Strategic Plan. Under Goal 4-3, *Support, Mentor and Develop Our Faculty and Clinical Instructors for Success*, one of the 2014-15 working groups undertook Priority Action #14**:** *Assess needs for – and launch – a formal faculty development program.* This evolved into the 2015-16 Priority Action #3: *Develop a formal program to strengthen teaching quality across undergraduate and graduate programs.* Its performance measure was: *The initiation of a formal faculty development program focused on teaching quality.* With the new academic administrator roles of Vice Dean Education, and Associates Deans of Undergraduate and Graduate Education, their responsibilities now include ensuring effective faculty development at all career stages. Initiatives include improved assessment and evaluation practices, working directly with course coordinators to ensure horizontal and vertical curriculum integration, and bringing together expertise through workshops and others means to improve excellence in teaching.

The Faculty's Dean's lecture series brings in top scientists internationally to present to and meet with faculty and students. Our Dental Education research focus also invites experts in health education to speak to faculty members. Programs have also been available centrally within the University to assist faculty in developing or enhancing teaching, research and administrative skills.

Beyond faculty-specific learning opportunities, all faculty are eligible for a 6 month sabbatical leave every third year, or a full-year sabbatical leave is available after every 6 years. Programs are also available centrally within the University to assist faculty in

developing or enhancing teaching, research and administrative skills. An example is the list of programs available from the Centre for Teaching Support and Innovation (CTSI). More recently, programs have been offered both centrally and within the Faculty to help faculty members enhance technology and media skills.

Professional development support is available to all full-time faculty members annually through a benefit entitled The Professional Expense Reimbursement Allowance (currently $1,700 for tenured faculty and $2,000 for pre-tenure faculty), to help offset the cost of attendance at scientific meetings or teaching institutes. A portion of the revenue from continuing education programs provided by specialties is retained by that discipline to use as further incentive and support for the faculty members to participate in professional development.

Presentation of papers or lectures at professional or research meetings are considered towards the annual merit pay increases. Participation in professional and research organizations is also rewarded through the Progress Through the Ranks (PTR) system.

Complement Plan

The complement planning for the future will need to balance the desire to continually strengthen our research and teaching missions against the fiscal realities of our budget. Unless the latter improves, it essentially prevents us from increasing overall FTE in spite of the increased enrolment that has occurred. Succession planning in the various fields must always be considered but is affected by the lack of mandatory retirement policies. We currently have relatively few faculty members who are in the teaching stream, and now plan on gradually increasing the number who will be in the professorial teaching stream to more appropriately allow increased focus in this area. We will also continue to rely on the valuable contributions of our Associates in Dentistry, who provide a great deal of our clinical teaching.

3. ACADEMIC PROGRAMS

DOCTOR OF DENTAL SURGERY (D.D.S.)

Program Description

Doctor of Dental Surgery (D.D.S.) is a 4-year undergraduate professional program designed to graduate general dentists who are competent in patient-centered care; professionalism; communication and collaboration; practice and information management; and health promotion. This is consistent with the statement by the Association of Canadian Faculties of Dentistry (ACFD) that a competent beginning general dentist in Canada must successfully integrate the understanding, skills, and values inherent in each of these 5 competencies. A copy of the *ACFD Educational Framework for the Development of Competency in Dental Programs* is included as an Appendix. The program is also consistent with, and meets, the requirements for D.D.S. programs as stated by the Commission on Dental Accreditation of Canada (CDAC). The Faculty of Dentistry D.D.S. program has always satisfied the CDAC standards as an accredited program in dentistry. A copy of the CDAC requirements for DDS/DMD programs is included as an Appendix.

Program Objectives

The objective of the D.D.S. program is to graduate clinically competent dentists with critical skills to be lifelong learners and hence adapt to the rapidly changing demands of the profession. The program also strives to instill a sense of social responsibility and the appreciation of interprofessional cooperation.

The D.D.S. program is consistent with the university's mission to be "*an internationally significant research university, with undergraduate, graduate and professional programs of excellent quality*". The quality indicators for this undergraduate professional program are listed later in this section.

The D.D.S. program is also consistent with the Faculty of Dentistry's own vision and mission, as listed in its current Strategic Plan. Namely, the Faculty of Dentistry Vision is "*We improve health by advancing dentistry through inspired leadership, innovation, and excellence in education, research and practice.*" Its mission is stated as:
We shape the future of dentistry and promote optimal health by:

- *Preparing the next generation of clinicians, scientists, educators and leaders in the profession*
- *Conducting high-impact research*
- *Establishing partnerships and networks locally, nationally and internationally to translate research knowledge into practice and policy*
- *Promoting comprehensive and patient-centred care from disease prevention to management*
- *Developing and supporting evidence-informed policies to advance and advocate for the needs of society*

Admission Requirements

The Faculty of Dentistry accepts applicants who have a minimum of 3 years of university level education and who have met the prerequisite requirements for admission to the 4-year D.D.S. program. The prerequisites education must include:

- One full year course (or 2 half year courses) in general biochemistry. This course should cover protein chemistry and the chemistry of other biomolecules, cellular metabolism and molecular biology.
- One full year course (or 2 half year courses) in general mammalian (human or animal) physiology. This course should cover the following systems: musculoskeletal system; haemostasis mechanisms; haematopoietic system; nervous system; immune system; cardiovascular system; renal physiology; neurophysiology; endocrinology and gastrointestinal physiology.
- Two additional full year courses (or 4 half year courses) in Life Sciences. (For example: anatomy, biochemistry, biology, botany, genetics, immunology, microbiology, molecular genetics/biology, neuroscience, nutritional Sciences, pharmacology, toxicology, physiology, zoology).
- One full year course (or 2 half year courses) in a Humanities or Social Science. (For example - Humanities: art history, classics, East Asian studies, English, history, languages, music, near & middle eastern studies, philosophy. Social Sciences: anthropology, economics, geography, management, political science, religious studies, sociology).

This program leads to eligibility to sit North American national dental board examinations and hence acquire professional registration in both Canada and the United States.

We also have special student status which covers aboriginal peoples and international applicants.

The Faculty welcomes applications from Aboriginal Peoples (Metis, Status Aboriginal, Non-Status Aboriginal, Inuit) in recognition of their under representation in the profession and of the unique contribution that trained members of this group can make. Applications from qualified persons of aboriginal ancestry receive special consideration for admission. Over the last 5 years, on average, the Faculty has offered one position to an Aboriginal student each year.

International applications are encouraged; however, they must meet the same admission requirements and standards as Canadian applicants. Most of these applications are from citizens of the United States because most dentistry courses of study overseas are first entry programs and hence applicants generally cannot meet our entry prerequisites. On average, there is one international student in each class.

The admission requirements are appropriate to the learning outcomes of the D.D.S. program, which are that the dental student will be competent in patient-centred care; professionalism; communication and collaboration; practice and information management; and health promotion. To achieve these competencies, the dental curriculum educates the student on biomedical, behavioural and clinical sciences.

Biomedical, behavioural and clinical science content must be of sufficient depth and scope for a dental graduate to apply advances in biomedical sciences to clinical practice and to integrate new medical knowledge and therapies relevant to oral health care; to manage diverse patient populations and develop the communication skills required to function successfully in a multi-cultural work environment; and to provide patient-centred approaches for promoting, improving and maintaining oral health.

Therefore the prerequisite education courses are aligned to ensure the dental student has adequate prior knowledge to learn and apply the higher concepts of biomedical, behavioural and clinical sciences that are taught in the dental curriculum.

Diversity is an important consideration in our D.D.S. classes, and we are proud that in the past 5 years the majority of our students are of racially and ethnically diverse backgrounds, and over 50% of our incoming classes are female. In an effort to improve the pipeline of diverse applicants for the future, the Faculty of Dentistry also financially contributes to, and is an active participant in, the University of Toronto Summer Mentorship Program in the Health Sciences. This is a Joint Partnership among the University of Toronto Faculties in the Health Sciences. It gives high school students of Indigenous or African descent a chance to explore health sciences at the University of Toronto in July every year. Students get the opportunity to discover university education and professional careers in the health sciences; get hands-on experience through experiments, lectures, and special projects; earn a credit towards their high school diploma; and experience valuable mentoring experiences from health professionals.

To address issues of diversity and inclusion the Dean struck a committee to study the recommendations put forth in the 2015 *Report from the Restorative Justice Process in the Dalhousie University Faculty of Dentistry* as well as the external review report of the *Task Force on Misogyny, Sexism and Homophobia* which followed an incident that arose at that institution. The project assesses the need for culture shifts within the Faculty and the need to develop in-house strategies so that the Faculty environment is one that is a safe place for everyone; faculty, staff and students. Furthermore, as the majority of undergraduate dental (D.D.S.) students and graduate students in the clinical specialty (residency) programs are women, and who come from diverse ethnic and cultural backgrounds, it is imperative that all members of our community understand the richness that diverse minds bring to the academic environment. We have brought together 7 members of our community, including faculty, staff and students. The Committee began its work in the fall of 2015 and it continues today. In the preceding 10 months, the Committee has met monthly to review the 37 recommendations of the Task Force and, within the next several months, will present a formal report to the Dean.

Curriculum and Program Delivery

A competent beginning general dentist in Canada must be able to independently provide oral health care for the benefit of individual patients and communities in a culturally sensitive manner.

A competent beginning general dentist in Canada must successfully integrate the understanding, skills, and values inherent in patient-centered care; professionalism;

communication and collaboration; practice and information management; and health promotion.

The degree level expectations for the D.D.S. program are those as set out by the CDAC, by which the Faculty must abide to meet accreditation standards.

The Undergraduate Education Committee (UGED) is the standing committee responsible for ensuring that the D.D.S. curriculum is current, relevant and appropriate for dental graduates. Much of the work of this committee is done through subcommittees which convene separately from UGED but report findings and recommendations back to the parent committee for discussion and approval. It is the responsibility of the UGED Committee to report to Faculty Council its deliberations, recommendations and decisions.

As stated in the Faculty of Dentistry's by-laws (see Appendix 8), the functions of this committee include the following:

1. To assure the quality and standards of the Faculty's undergraduate dental programs.
2. To plan the curriculum in terms of the knowledge and competencies needed for graduates of the undergraduate programs.
3. To determine which courses in the undergraduate curricula shall be required for standing in the undergraduate dental programs, and make recommendations to Council.
4. To monitor and integrate the curriculum.
5. To receive written reports from the Director of the CCP.
6. To be responsible for the program in hospital dentistry for undergraduate students.
7. To give advice and recommend policies on undergraduate educational matters pertaining to clinic operations and patient care.
8. To seek out and consider educational innovations taking place in other dental and health science institutions.
9. To foster the development and application of innovative educational methods in the undergraduate dental programs, including appropriate faculty training.
10. To foster the development and use of valid and reliable measures for assessing the outcomes of the Faculty's educational programs.
11. To form ad hoc Working Group(s) charged with planning and developing items 8, 9 and 10 or others as may be necessary and reporting to the Committee.
12. To report to Council its deliberations, recommendations and decisions.

A general outline of the year's schedule as well as the methods of course evaluation for all courses are provided to all students at registration at the beginning of the academic year. The individual course descriptions, content outlines, objectives and outcomes, learning activities and evaluation procedures are provided to the class at the beginning of each

course. Course objectives are also outlined in the Faculty calendar (included as Appendix 9). Lectures, seminars, small group sessions, case-based learning, laboratory sessions, pre-clinical sessions, and direct clinical teaching are all used to varying degrees, depending on the specific course. Evidence-based dentistry underlies clinical teaching. Every student at the beginning of DDS III receives a manual entitled Clinical Evaluation Criteria and Minimum Clinical Core Experience. Every course director is also provided with a copy for distribution to their own faculty. The required competencies are contained within this manual. This manual details the various course/clinic objectives, competencies to be attained, and their assessment processes. The grading criteria used by different disciplines are explained within this manual. A list of the undergraduate courses is included in Appendix 10.

Students are advised of the individual clinic and discipline requirements at various orientations sessions provided at the start of each course or academic year.

Within the framework of comprehensive patient-centred care and combined with attendance at specific clinic assignments, a number of defined core clinical experiences will be required to ensure that students have been exposed to a minimum basic range of clinical practice in all clinical disciplines. It is expected that students will gain a wider range of experiences wherever possible, to be fully prepared for general practice.

As part of the 2014-19 Strategic Plan Goal 1-1*: Design and Implement Curriculum Renewal*; the 2014-15 Priority Action #1 was**:** *Create a plan for a renewed undergraduate curriculum to streamline and improve coherence, creating core curriculum and electives*. This led to the curriculum being streamlined and efforts have been made to improve coherence. Curriculum renewal and innovation include the adoption of the ACFD framework to ensure all 5 competencies are being taught and evaluated. Furthermore, focus has been on the perceived weakness in the curriculum that was identified by the D.D.S. graduate survey which was conducted in 2011. The topic of occlusion was reviewed. Implant therapy has been strengthened by introduction of increased preclinical sessions and plans have been developed to significantly increase the clinical experience in restoring implants. Additional curriculum renewal includes the addition of a clinical component to the practice management course. The DDS II and DDS III ethics courses were improved based on the course evaluation and feedback. Education on ethics has been expanded to now include a component in DDS IV.

Learning beyond the classroom has been made available to the students. To foster integration of social responsibility, a new course on community-based service learning was developed. Students observe and practice dentistry at off-site locations. Local locations have included the Centre of Addiction and Mental Health (CAMH), St. Michael's Hospital and George Brown College. International locations have included sites such as Ethiopia and Uganda.

Student research experience is available from the Summer Research Program that takes place annually, as described in the section on Research. An average of 15 to 20 undergraduate students take part in this program every summer.

Assessment of Learning

In didactic courses, term test and assignment marks are provided as soon as available. Final grades are given at the end of the academic year. In the pre-clinical and clinical courses, formative evaluation takes place throughout the academic year by direct instructor contact. In these courses summative evaluation takes place in addition to the formative, either in parts, or throughout (through daily clinical grading) the entire year.

There are various means available to monitor student clinical experiences to ensure that adequate opportunities have been provided to each student to obtain competency. Each clinical discipline course director can access student progress through the "Reportal" computerized system which provides an ongoing, current counting of specific items of completed treatment pertinent to the specific discipline. These discipline-specific reports have been developed according to the needs and request of each clinical discipline for their own specific purposes. Student progress in amounts of treatment completed relative to other members of the class, as well as progress towards the mandatory Minimum Core Experiences (MCE), can be readily monitored. In addition, the Faculty Laboratory tracks all patient treatment that has a laboratory component (crowns/FPD/RPD/implants/complete dentures, etc.). This provides additional information with regard to clinical treatments recently initiated or in progress, which greatly assists Restorative and Prosthodontic course directors in monitoring student progress towards the mandatory MCEs.

The Faculty has utilized Reportal software to develop the Comprehensive Care Program (CCP) Student Activity Reports which can extract the information from the patient management system within minutes. This multi-disciplinary report summarizes planned/in progress and completed clinical experiences for key items of treatment in each major clinical discipline for every student. This report provides the Director of Clinics, Patient Manager and CCP Director with an overview of the number of assigned patients, the date each patient last attended in clinic, whether a treatment plan has been formulated or not, and the type of treatment necessary.

In addition, Faculty Student Progress Meetings are held on a regular basis where students' clinical abilities and progress are reviewed and discussed. These meetings are attended by the course directors from each undergraduate clinical discipline, the Director of CCP, the Clinic Director/Assistant Dean Clinics, the Patient Manager, Faculty Registrar, the Vice-Dean Education, and the Dean. These are held twice a year for the third year students and at least three times a year for the fourth year students. Additional meetings for the fourth year students are scheduled in their final term if it is decided that it is necessary. Students with quantitative or qualitative issues are noted, decisions are made as to how to manage each issue and the most appropriate member of staff (academic or administrative) is asked to follow up with the student to resolve the specific issue. In terms of students in DDS IV who have a shortfall of specific MCEs, a system of "within-class" referrals has been developed to provide specific items of treatment.

Student Awards

Student engagement and activities play a vital role at the Faculty of Dentistry, and awards are presented annually in recognition of outstanding student achievement. A number of awards are offered as scholarships and bursaries, and recognize a wide range of achievements. A complete listing of our numerous awards for students that recognize both academic and extracurricular achievement can be found in our Calendar (see Appendix 9).

Student Funding

Financial support is available to D.D.S. students from OSAP (Ontario Student Assistance program), UTAPS (University of Toronto Advance Planning for Students) and faculty bursaries. Data are below:

Table 3.1: UTAPS Numbers: Dentistry

	2011-12		2012-13		2013-14		2014-15	
	$ Issued	**Recipients**	**$ Issued**	**Recipients**	**$ Issued**	**Recipients**	**$ Issued**	**Recipients**
Undergraduate	709,895	223	705,800	200	820,079	242	978,532	286
Graduate	44,612	16	16,352	7	20,732	6	17,750	5
Total	**754,507**	**239**	**722,152**	**207**	**840,811**	**248**	**996,282**	**291**

Table 3.2: OSAP Numbers: Dentistry

Year	2011 -12		2012 -13		2013-14		2014-15		2015-16	
	$ Issued	**Recipients**	**$ Issued**	**Recipients**	**$ Issued**	**Recipients**	**$ Issued**	**Recipients**	**$ Issued**	**Recipients**
UG	$3,137,899	215	$2,985,600	202	$3,445,884	233	$4,111,157	275	$4,742,262	302
Grad	$89,602	5	$79,737	7	$121,003	9	$122,936	7	$130,510	7
Total	**$3,227,501**	**220**	**$3,065,337**	**209**	**$3,566,887**	**242**	**$4,234,093**	**282**	**$4,872,772**	**309**

Quality Indicators

The D.D.S. program accepts 96 students into its first year and an additional 24 join the class at the beginning of the third year from the International Dentist Advanced Placement Program (IDAPP), where they are fully integrated into D.D.S. program. If there are vacancies for second-year D.D.S., these are filled in from a pool of Canadian applicants wishing to transfer from another accredited dental school.

Domestic applications for the D.D.S. Program have been steadily climbing for the last 5 years with a low of 479 applications to a high last year of 546. The ratio of offers to acceptances has declined a bit during the last couple of years and we attribute this to the increase in enrollment. The mean grade point average (GPA) of students accepted into the program has remained consistently high over the past 5 years and the number of applicants, always being within the range of 3.8 to 3.9. The number of those with graduate degrees has recently decreased from a high of 44% of the entering class in 2011 to 22% in

2015, following the Faculty of Dentistry's adjustment to the amount of the bonus being provided to the graduate applicants.

Table 3.3: Domestic D.D.S. Applications, Offers, Registrations

	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Applications	459	458	462	483	467	499	538	540
Offers	90	91	92	83	84	119	121	139
Registrations	65	64	65	64	65	84	95	96
Registered / Offered Yield	72.2%	70.3%	70.7%	77.1%	77.4%	70.6%	78.5%	69.1%

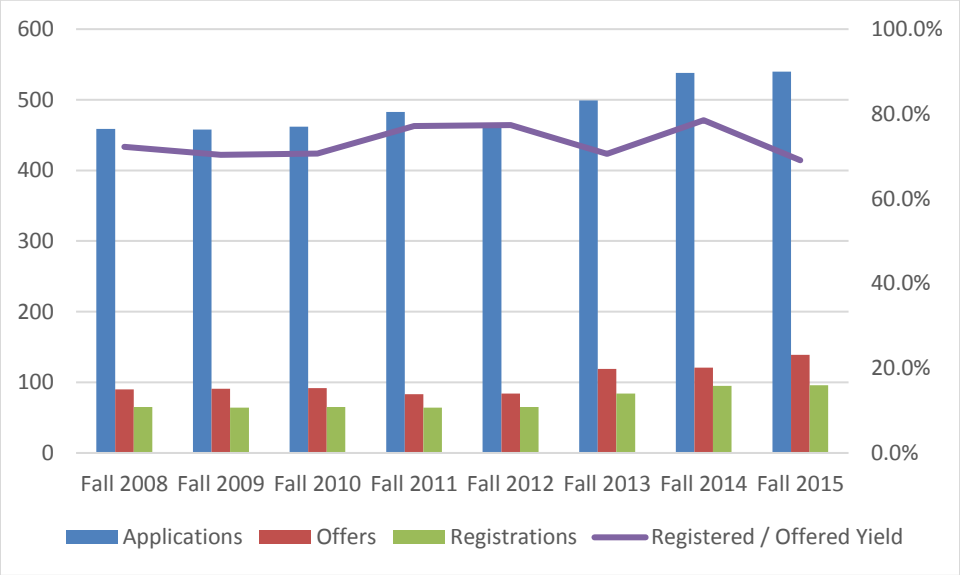


Table 3.4: International D.D.S. Applications, Registrations, Offers

	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Applications	25	12	15	12	12	6	2	6
Offers	2	0	1	4	0	1	1	2
Registrations	1	0	1	2	0	0	1	2
Registered / Offered	50.00%	0.00%	100.00%	50.00%	0.00%	0.00%	100.00%	100.00%

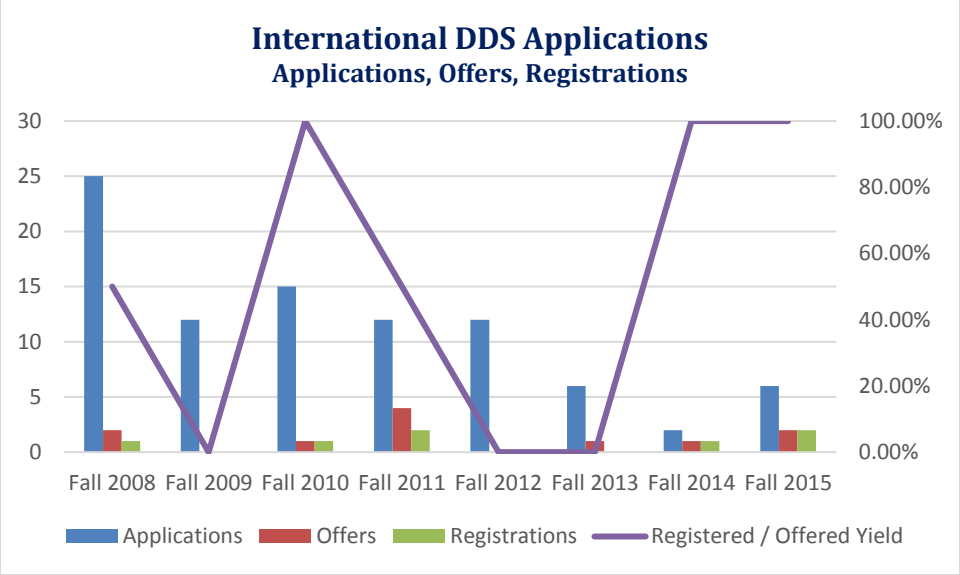


Table 3.5: Prior University Education and GPA on Admission

	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
3 Years	14	15	15	9	9	15	20	15
4 or more Years	38	24	28	27	29	35	37	60
Master's Degree	12	23	22	28	27	31	36	19
Ph.D. Degree	0	2	0	0	0	3	2	2
Returning Student	1	0	0	0	0	0	0	0
Mean Grade Point Average of Registered Students	3.84	3.83	3.85	3.82	3.85	3.85	3.86	3.9

Another means to assess quality is by inspecting our students' success rate while taking the NDEB examinations. There are 2 assessments which students must pass in order to be eligible for licensure: the Written Examination and the Objective Structured Clinical Examination (OSCE). The table below shows our students' pass rate over the past 5 years, which reveals very high success, consistent with a high quality educational program (data obtained from the NDEB).

Year	Written exam pass rate	OSCE pass rate
2015	100%	100%
2014	98%	100%
2013	99%	100%
2012	100%	100%
2011	97%	96%

Graduation and Employment Rates

The graduation rates and employment rates have consistently been very high, nearing 100%. The most recent data looking at the 2006-2012 period show a graduation rate of 97.0% and a 2-year employment rate of 100%.

Quality Enhancement

The 2014-19 Strategic Plan identified a number of areas for improvement of the learning and teaching environment. The Direction of *Enriching Our Educational Programs through Innovation and Scholarship* had several goals with this intention. Specifically:

Goal 1-1: Design and implement curriculum renewal

Goal 1-2: Strengthen teaching across all programs

Goal 1-3: Establish new educational program options

Goal 1-4: Foster the teaching of social responsibility through community outreach

Each of these goals developed their own specific priorities. In the first year of the plan (2014-15), the following were priorities related to enhancing the quality of the D.D.S. program:

Priority Action #1: *Create a plan for a renewed undergraduate curriculum to streamline and improve coherence, creating core curriculum and electives.*

Priority Action #2: *Assess needs regarding teaching quality and develop programs to outline and implement interventions.*

Priority Action #3: *Initiate outreach opportunities in community settings that serve populations in need.*

In the second year of the plan (2015-16), the following were priorities related to enhancing the quality of the D.D.S. program:

Priority Action #1: *Design and implement DDS curriculum renewal, including exploring the feasibility of added electives and core curriculum*

Priority Action # 2: *Renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment*

Priority Action # 3*: Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*

For the third year of the plan (2016-17), the following are priorities related to enhancing the quality of the D.D.S. program that are being pursued:

Priority Action #1: *Renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment*.

Priority Action #2: *Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*.

Priority Action #3: *Determine feasibility of introducing a model to better integrate basic science into clinical training in undergraduate education*

Working groups assigned to each of these action items work towards the same goal of quality enhancement. The progress is summarized in the Strategic Plan Progress reports included in Appendices 2 and 3.

Challenges and Opportunities

There are two main areas for consideration. The first has to do with our ability to sustain the high quality of applicants for our D.D.S. program. We have been very fortunate in this regard until now. Yet, it would be wrong to be complacent, as applicants have many other dental schools from which to select. We need to do what we can to continue to attract high caliber students. As such, we need to continue to investigate means to sustain quality. In part, this work will be undertaken through consideration to revise the admissions process, a review of which is currently being undertaken by the new Chair of the Admissions Committee, the Vice Dean of Education.

The second consideration is related to the first. We must continue to improve the experience of our D.D.S. students. Our strategic planning process identified that student experience was not what it should be. This led to the 2014-19 Strategic Plan Goal 4-2*: Strive for an Outstanding Student Experience from Application to Graduation and Transition to Alumni Engagement*, and the 2014-15 Priority Action #12: *Appoint a Lead for Student Life to focus on student engagement, well-being, and student life.* As a result, we created the position of Director of Student Life. This person acts as a resource and an advocate for all students. In addition, an external review of our Registrar's Office and student services will provide recommendations for further steps.

GRADUATE PROGRAMS: M.Sc. and Ph.D.

Program Description

The Graduate Department of Dentistry offers doctoral stream Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.) degree programs, either without or with concurrent clinical training in a dental specialty. Both streams offer diverse, research-intensive learning environments for the advanced education of research scientists, specialist clinicians and specialist clinician-scientists.

The M.Sc. and Ph.D. degrees are research-intensive programs intended for individuals with an interest in oral health science research, while the M.Sc. and Ph.D. degrees with specialty training combine research with clinical training in one of the 10 dental specialties (Dental Public Health, Endodontics, Oral & Maxillofacial Pathology, Oral & Maxillofacial Radiology, Oral & Maxillofacial Surgery, Oral Medicine, Orthodontics and Dentofacial Orthopedics, Pediatric Dentistry, Periodontics and Prosthodontics) recognized by the Canadian Dental Association and accredited by the Commission on Dental Accreditation of Canada (CDAC), and Dental Anaesthesia (recognized by the Royal College of Dental Surgeons of Ontario). Graduates of the CDAC-accredited specialty programs are qualified to challenge the National Dental Specialty Examination (NDSE) in their respective specialty, administered by the Royal College of Dentists of Canada (RCDC). Successful candidates can then register as specialists in their area of dentistry, and acquire a license to practice through the provincial/territorial dental regulatory authorities. As per CDAC and RCDC, these educational programs provide graduates with entry level competency in the knowledge and skills required for entry-level specialists in Canada.

The University of Toronto is the only Canadian university that offers specialty training in all of the recognized dental specialties and Dental Anaesthesia, and is the sole Canadian program for clinical training in Dental Public Health and Oral and Maxillofacial Radiology. The Faculty also offers a unique course-based M.Sc. program with an emphasis in Dental Public Health for applicants who have completed dental hygiene training and a 4-year baccalaureate degree in dental hygiene from a recognized university.

Specific reports for each of the specialty degree programs follow the overall description for the M.Sc. and Ph.D. programs.

Program Objectives

Master of Science

The goal of the M.Sc. program is to develop scholarly skills and critical thought, and is intended for those whose career goal is to achieve mastery of a field of oral health science, employment in a research environment or clinical specialty practice. The objectives of the M.Sc. program are to:

1. become engaged in a culture of learning and knowledge generation in the oral health sciences, and more broadly, in science.
2. develop competence in the development and execution of a novel research question in a specialized area of an academic discipline.
3. acquire critical skills in the analysis and interpretation of data.
4. demonstrate competence in the management and communication of scientific information.

The typical length of the M.Sc. program is 2 to 3 years. The M.Sc. degree can also be completed with concurrent clinical training in a dental specialty, and the length of these programs can vary from 2 to 4 years. In both cases, a student accepted to the program selects an individual research project that is supervised by a faculty member with an appointment in the School of Graduate Studies and a supervisory committee. The student is required to undertake didactic coursework and clinical training (in the case of the specialty programs) in addition to their research work. As an alternative to the traditional thesis-based M.Sc., the Faculty also offers a course-based M.Sc. for students enrolled in dental specialty training. In this program, students undertake an additional 1.5 full course equivalents (FCE) of additional coursework and undertake a research practicum that is defended in the form of a Research Practicum Report.

Applications to the M.Sc. program has remained constant (and strong). As the majority of applications are made to the M.Sc. program with concurrent training in one of the dental specialties, our data suggest that there continues to be a strong interest in specialization in the dental profession, and in the programs offered by the University of Toronto.

Application and admissions data for the M.Sc. programs with specialty training are summarized below, as follows. Table 1 summarizes the maximum enrollments in the graduate specialty programs.

Table 3.6: M.Sc. with Dental Specialty Program Lengths and Maximum New Registrants

	Program Length	Minimum CDAC[1] Program Length	Maximum New Registrants/Year
Dental Public Health	2 years	2 Academic Years[2]	4
Dental Anaesthesia	3	-	2
Endodontics	3	2	3
Oral & Maxillofacial Radiology	3	3	2
Oral & Maxillofacial Surgery	4	48 months	3
Oral Medicine & Oral & Maxillofacial Pathology	4	4	1
Orthodontics & Dentofacial Orthopedics	3	2	4
Pediatric Dentistry	3	2	4
Periodontics	3	3	3
Prosthodontics	3	3	2

[1]The Commission on Dental Accreditation of Canada.
[2]An academic year is defined as being 11 months in length.

Tables 3.2 and 3.3, and Figure 3.1 summarize the numbers of applicants to all M.Sc. programs as a group, numbers of offers made and numbers of acceptances. We see small changes year-to-year for all M.Sc. students; both those who engage in clinical specialty training and those who do not.

Table 3.7: Applications, Offers and Registrations in the Graduate Department of Dentistry M.Sc. Programs

	2010-11	2011-12	2011-13	2013-14	2014-15
Applications	267	247	252	234	243
Offers	42	42	35	36	40
New Registrants	33	32	30	29	28

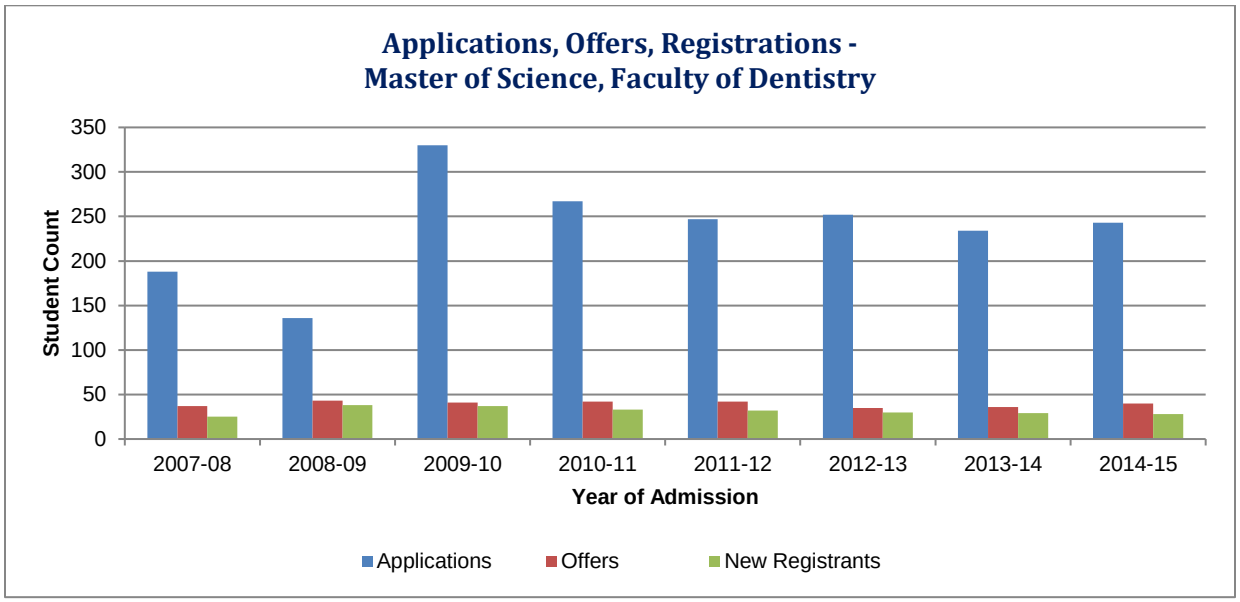


Figure 3.1: Applications, Offers and Registrations in the Graduate Department of Dentistry M.Sc. Programs

Table 3.8: Offer and Acceptance Rates in Dentistry M.Sc. Programs

	2010-11		2011-12		2012-13		2013-14		2014-15	
	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept
Dentistry	15.7 %	78.6%	17.0 %	76.2%	13.9 %	85.7%	15.4 %	80.6%	16.5 %	70%
Div. IV Life Sci.	41.1	60.9	39.0	58.2	37.1	58.7	36.1	60.5	38.1	56.5
UofT	30.9	56.7	30.3	55.9	28.6	55.8	29.1	58.0	29.2	55.5

For those applicants who do not engage in clinical specialty training, their acceptance into the M.Sc. program are determined in part, by the availability of funding during year 1 by the Principal Investigator. Furthermore, if the applicant is a foreign student, the Principal Investigator is responsible for paying the tuition fee differential for the duration of their enrollment, and some Principal Investigators are reluctant to do this. Some applicants are applying to the M.Sc. program with the intention of applying to the D.D.S. program at a later date due to a low grade point average during their baccalaureate degree.

For applicants for the M.Sc. programs with clinical specialty training (who are not funded), there have been some year-to-year fluctuations since the 2010-11 academic year (Table 4). In particular, we have observed that a number of these students, once accepted, have withdrawn for "personal reasons" at or near the start of the program. This is particularly difficult for us, as we are unable to fill an open position at the last minute when applicants who might have been on a waiting list may have already accepted entry into a similar program at other institutions.

Table 3.9: Enrollments in Dentistry M.Sc. Programs

Degree	Attendance Class	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
M.Sc.	FT	17	15	15	14	11
	PT	0	0	0	0	0
M.Sc. with Specialty Training	FT	84	86	82	75	76
	PT	1	1	0	1	0
Total M.Sc.	FT	101	101	97	89	87
	PT	1	1	0	1	0

Doctor of Philosophy

The Ph.D. degree program is intended those whose career goal is to work at the forefront of their field in the oral health sciences as an independent research scientist or clinician-scientist in an academic, governmental or industrial setting. The objectives of the Ph.D. program are to:

1. generate new knowledge through the development of novel hypotheses and scientific approaches.
2. refine skills in data analysis and interpretation, and critical thinking.
3. develop clear and effective skills in the communication of complex scientific information.
4. develop an understanding of the connectivity between one's own specialized area within the oral health sciences, and within the broader scope of science.

The typical length of the Ph.D. program is 4 to 5 years. The Ph.D. degree can also be completed with concurrent training in a dental specialty, and the length of this program can vary from 5 and 7 years. In both cases, a student selects an individual research project that is supervised by a faculty member who is fully appointed in the School of Graduate Studies and a supervisory committee. The student is required to undertake didactic coursework and clinical training (in the case of the specialty programs) in addition to their research work.

Application and admissions data for the Ph.D. programs with specialty training are summarized below, as follows. Table 5 summarizes the numbers of applicants to the programs as a group, numbers of offers made and numbers of acceptances. Figure 2, and Tables 6 and 7 summarize the offer and acceptance rates, and enrollments.

For those students who do not engage in clinical specialty training, transfer or direct entry into the Ph.D. program is, like the M.Sc. program, determined in part, by the availability of funding during years 1 and 5 by the Principal Investigator. As well, if the applicant is a foreign student, the Principal Investigator is responsible for paying the tuition fee differential for the duration of their enrollment, and again, some Principal Investigators are reluctant to do this. Many of the most recent applicants who have requested direct entry into the Ph.D. program are foreign students whose governments are providing funding for them. The Graduate Department of Dentistry continues to be a sought-after destination for students from Saudi Arabia and Egypt.

Although the demand is comparatively lower for the Ph.D. programs with clinical specialty training than the M.Sc. programs with clinical specialty training, we have a small cohort of interested applicants who see a future for themselves as academic clinician-scientists. The lower numbers are, in part, due to the length of the programs (5 to 7 years), and the desire by more recent graduates to enter private practice. Private practice incomes for specialists in dentistry continue to outpace university salaries significantly, and in particular, for clinical specialties such as Orthodontics, Periodontics, Pediatric Dentistry and Oral and Maxillofacial Surgery. Historically, many clinician-scientists who have become faculty members at universities across Canada have trained at the University of Toronto, so we

continue to see the training of academic clinician-scientists as an important part of our mandate.

Table 3.10: Applications, Offers and Registrations in Dentistry Ph.D. Programs

	2010-11	2011-12	2011-13	2013-14	2014-15
Applications	24	27	28	39	36
Offers	7	9	5	8	5
New Registrants	5	6	2	5	5

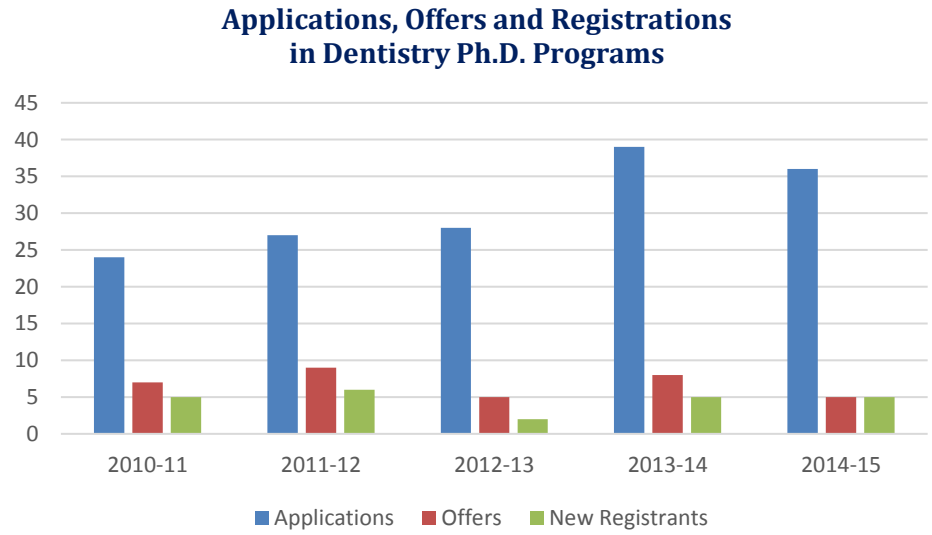


Figure 3.2: Applications, Offers and Registrations in the Graduate Department of Dentistry Ph.D. Programs

Table 3.11: Offer and Acceptance Rates in Dentistry Ph.D. Programs

	2010-11		2011-12		2012-13		2013-14		2014-15	
	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept
Dentistry	29.2%	71.4%	33.3%	66.7%	17.9%	40.0%	20.5%	62.5%	13.9%	100%
Div. IV Life Sci.	36.9	70.2	36.8	72.8	35.9	70.7	36.9	64.7	35.6	67.7
UofT	25.7	62.5	22.7	64.8	23.6	63.6	25.1	64.6	25.1	63.4

Table 3.12: Enrollments in Dentistry Ph.D. Programs

Degree	Attendance Class	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Ph.D.	FT	25	27	28	28	23
	PT	0	0	0	0	0
Ph.D. with Specialty Training	FT	5	4	3	2	1
	PT	0	0	0	0	0
Total Ph.D.	FT	30	31	31	30	24
	PT	0	0	0	0	0

Admission Requirements

Master of Science

Applicants to the M.Sc. program should hold an appropriate four-year baccalaureate degree with a final year average of at least a B^+ (3.30 GPA) from a recognized university. Applicants to the M.Sc. program with dental specialty training must hold a D.D.S. degree or its equivalent, with a final year average of at least a B^+ (3.30 GPA) from a recognized university.

Doctor of Philosophy

Applicants requesting direct entry to the Ph.D. program must hold a Master's degree with an average of at least an A^- (3.70 GPA) or demonstrated comparable research competence. Applicants requesting direct entry to the Ph.D. program with dental specialty training must hold a D.D.S. degree or its equivalent, with a final year average of at least an A^- (3.70 GPA) from a recognized university.

In addition to the specific requirements for the M.Sc. and Ph.D. degrees, an applicant whose first language (i.e. the language learned at home as a child) is not English and who has completed less than four years of full-time academic study in an English language school system located in a country where English is the primary language, is required to achieve an appropriate standard in a recognized test of English facility.

The Department endeavours to find an appropriate balance between an applicant's academic record and the research interests of both the applicant and a faculty member. Because the M.Sc. and Ph.D. programs require the student to undertake rigorous coursework, it is important for the applicant to demonstrate a track record of achievement at the undergraduate level. And as clinical specialty training builds on concepts developed during an undergraduate curriculum in dentistry, it is important for applicants to these programs be able to demonstrate a track record of achievement in their D.D.S. (or equivalent) program.

Curriculum and Program Delivery

All students are required to complete DEN 1010H (Research Ethics), DEN 1015H (Biostatistics), and DEN 1001Y/DEN 1100Y (Oral Health Science Seminars). A full list of graduate courses at the Faculty of Dentistry is included in Appendix 11.

Students are also required to form a supervisory committee to ensure progress through the program. Such a committee is composed of the primary supervisor and at least 2 other faculty members with expertise in the research area, appointed with Associate (M.Sc.) or Full (Ph.D.) status in the School of Graduate Studies. At least one committee meeting is required in each academic year (prior to June 30).

Master of Science

Students in the M.Sc. program are expected to attend 50% of the Oral Health Science Seminar series in each year of their program from entry to thesis defense. As well, students are required to chair 1 seminar presentation, make 1 seminar presentation, and make 1 presentation at the Faculty's annual Research Day during the course of their program. An additional 1.0 FCE (full course equivalent) of coursework is required in areas related to the student's research. At the completion of the program, the student produces a thesis that is examined orally by a committee that is to include: i) the primary supervisor; ii) 1 or 2 supervisory committee members; iii) a Graduate Department of Dentistry faculty member not affiliated with the research group; and iv) a University of Toronto faculty member external to the Graduate Department of Dentistry.

Students enrolled in the thesis-based M.Sc. programs with dental specialty training are required to attend 50% of the seminar series in 1 year of their program, chair 1 seminar presentation, make 1 seminar presentation and make 1 presentation at the Faculty's annual Research Day during the course of their program. As well, students who are undertaking concurrent dental specialty training enroll in DEN 1014H (Clinical Epidemiology and Evidence-based Care) and specialty-related didactic and clinical coursework. At the completion of the program, the student produces a thesis that is examined orally by a committee that is to include: i) the primary supervisor; ii) 1 or 2 supervisory committee members; iii) a Graduate Department of Dentistry faculty member not affiliated with the clinical specialty; and iv) a University of Toronto faculty member external to the Graduate Department of Dentistry.

The degree level expectations for the M.Sc. with specialty training are those as set out by the CDAC, by which the Faculty must abide to meet accreditation standards.

Students enrolled in the course-based M.Sc. programs with dental specialty training are required to attend 50% of the seminar series in 1 year of their program, chair 1 seminar presentation, make 1 seminar presentation and make 1 presentation at the Faculty's annual Research Day during the course of their program. As well, students are required to take an additional 1.5 FCE of coursework above and beyond what is expected in the thesis-based M.Sc. program. In lieu of thesis research, the student completes a research practicum in an area related to the clinical specialty. At the completion of the program, the student produces a research report that is examined orally by a committee that is to include: i) the

primary supervisor; ii) 1 or 2 supervisory committee members; and iii) a Graduate Department of Dentistry faculty member not affiliated with the clinical specialty.

Students accepted into the M.Sc. program who do not undertake concurrent specialty training are offered 2 years of funding, which include the payment of a stipend and University tuition. In year 1, these costs are borne by the research supervisor, and in year 2, these costs are borne by the Faculty. Students accepted into the M.Sc. programs in Oral & Maxillofacial Pathology and Oral Medicine, and Oral & Maxillofacial Surgery are funded for a total of 4 years with a stipend from the Government of Ontario Ministry of Health and Long-Term Care. Students enrolled in all other M.Sc. programs with specialty training are unfunded.

Master of Science to Doctor of Philosophy Transfer

Students enrolled in the M.Sc. may apply for transfer into the Ph.D. program within 12 to 24 months of the program starts. M.Sc. students undertaking specialty training do may not begin the research phase of their programs until year 2 or 3 (for the 4 year programs), so we offer greater flexibility for them should they wish to transfer into the Ph.D. program; between 24 and 36 months.

The student prepares a proposal and a 20 minute presentation that is defended orally in an examination chaired by the Associate Dean for Graduate Education or his/her designate. The transfer examination committee consists of: i) the primary supervisor; ii) 1 or 2 supervisory committee members; iii) a Graduate Department of Dentistry faculty member not affiliated with the research group or specialty; and iv) a University of Toronto faculty member external to the Graduate Department of Dentistry who has full membership in the School of Graduate Studies.

Doctor of Philosophy

Students in the Ph.D. program are expected to attend 50% of the Oral Health Science Seminar series in each year of their program from entry to thesis defense. As well, students are required to chair 1 seminar presentation, make 2 seminar presentations, and make 2 presentations at the Faculty's annual Research Day during the course of their program. An additional 2.0 FCE (full course equivalent) of coursework is required in areas related to the student's research. Within 18 months of entry, the student challenges the Ph.D. Qualifying Examination. The student prepares a proposal and a 20 minute presentation that is defended orally in an examination. The Qualifying Examination is chaired by the Associate Dean for Graduate Education or his/her designate. The qualifying examination committee consists of i) the primary research supervisor; ii) 1 or 2 supervisory committee members; iii) 1 faculty member who is external to the research group; and iv) a member who holds full membership status in the School of Graduate Studies who is external to the Graduate Department of Dentistry. At the completion of the program, the student produces a thesis that is examined orally by a committee of at least 5 faculty members; i) one of whom is a member of the supervisory committee; ii) one of whom holds full membership status in the School of Graduate Studies from the Graduate Department of Dentistry; iii) one of whom holds full membership status in the School of Graduate Studies who is external to the Graduate Department of Dentistry; and iv) one of whom is external to the University of

Toronto, but holds the equivalent of full membership in his/her university's School of Graduate Studies or equivalent. Furthermore, the external examiner must not be a collaborator of the research supervisor within the past 5 years.

Students in the Ph.D. program with dental specialty training are expected to attend 50% of the Oral Health Science Seminar series in each year of their program from entry to thesis defense. As well, students are required to chair 1 seminar presentation, make 2 seminar presentations, and make 2 presentations at the Faculty's annual Research Day during the course of their program. Students also enroll in DEN 1014H (Clinical Epidemiology and Evidence-based Care) and specialty-related didactic and clinical coursework. An additional 2.0 FCE (full course equivalent) of coursework is required in areas related to the student's research. The Qualifying Examination is chaired by the Associate Dean for Graduate Education or his/her designate. The qualifying examination committee consists of i) the primary research supervisor; ii) 1 or 2 supervisory committee members; iii) 1 faculty member who is external to the research group; and iv) a member who holds full membership status in the School of Graduate Studies who is external to the Graduate Department of Dentistry. At the completion of the program, the student produces a thesis that is examined orally by a committee of at least 5 faculty members; i) one of whom is a member of the supervisory committee; ii) one of whom holds full membership status in the School of Graduate Studies from the Graduate Department of Dentistry; iii) one of whom holds full membership status in the School of Graduate Studies who is external to the Graduate Department of Dentistry; and iv) one of whom is external to the University of Toronto, but holds the equivalent of full membership in his/her university's School of Graduate Studies or equivalent. Furthermore, the external examiner must not be a collaborator of the research supervisor within the past 5 years.

Applicants accepted into the Ph.D. program are offered 5 years of funding, which include the payment of a stipend and University tuition. In years 1 and 5, these costs are borne by the research supervisor, and in years 2, 3 and 4, these costs are borne by the Faculty. Students accepted into the Ph.D. programs in Oral & Maxillofacial Pathology and Oral Medicine, and Oral & Maxillofacial Surgery, which are typically 7 years in length, receive funding for a total of 4 years with a stipend from the Government of Ontario Ministry of Health and Longterm Care. The additional 3 years of funding is provided at the level awarded to Ph.D. students who are not engaged in specialty training; 2 years from their research supervisor and 1 year from the Faculty. For students accepted into the other Ph.D. programs with dental specialty training, students are funded by their research supervisor or the Faculty for 4 or 5 years and are unfunded for 1 or 2 years depending on the specialty area.

Collaborative Programs

The Graduate Department of Dentistry is a member of the following Collaborative Programs: Aging, Palliative & Supportive Care Across Life Course; Biomedical Engineering; Cardiovascular Sciences; Global Health; Musculoskeletal Sciences; Neuroscience; and Women's Health.

Assessment of Learning

Performance in didactic or clinical coursework is evaluated by individual course directors. Progress is assessed at yearly (or more frequently) supervisory committee meetings. As part of the Supervisory Committee Meeting Report, the student is evaluated in the following areas: oral presentation skills; publications; abstracts presented at national or international meetings. As well, following an update on the student's research and progress, the following additional topic areas are evaluated: organization; presentation; ability to respond to questions; interval research progress; related reading; ability to interpret data, design experiments, productivity; ability to discuss keep clear records, results and to write. Failure to achieve a "Satisfactory" standing in 2 consecutive Supervisory Committee Meeting Reports may result in sanctions that may include ineligibility for financial assistance, priority for bursaries and assistantships or termination of registration.

Quality Indicators

The University of Toronto is recognized worldwide as one of the preeminent institutions for graduate research and clinical training in the oral health sciences. In recent years, the Graduate Department has attracted students from across Canada as well as Brazil, Egypt, Germany, Hungary, India, Iran, Iraq, India, Kuwait, Mexico, the Peoples' Republic of China, Taiwan and Saudi Arabia into its M.Sc. and Ph.D., and M.Sc. and Ph.D. programs with specialty training. While some international students have returned to their countries and have accepted faculty positions at their home institutions, many have remained in Canada. For individuals who have successfully completed M.Sc. or Ph.D. programs with clinical specialty training, all have become employed in their fields of clinical specialization in private dental specialty practice, in their local Faculty or School of Dentistry, or a combination of the two.

Table 3.13 shows the mean times to completion for all M.Sc. and Ph.D. programs at the Faculty of Dentistry from the University of Toronto Quality Assurance Process.]Because these data encompass all graduate programs in the Faculty of Dentistry (i.e. they do not separate data between students enrolled in concurrent specialty programs), the mean completion times for Dentistry M.Sc. programs are typically greater than for other M.Sc. programs in the Life Sciences and at the University of Toronto, in general.

Table 3.13: Mean Completion Times for M.Sc. and Ph.D. Degree Programs (in years)

Graduation Year	Dentistry		Life Science		All UofT	
	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.
2010-2011	3.0	4.0	2.4	5.8	1.7	5.7
2011-2012	3.1	6.0	2.3	6.1	1.8	5.8
2012-2013	3.2	5.2	2.3	5.9	1.7	5.7
2013-2014	3.3	5.6	2.3	6.0	1.8	5.9
2014-2015	3.3	5.3	2.3	6.0	1.7	5.9

Data from the Canadian Graduate & Professional Student Survey (CGPSS) shows comparable or higher satisfaction with respect to benchmarks for Student Satisfaction (Table 3.14).

Table 3.14: Student Satisfaction M.Sc. and Ph.D. Students (2013 CGPSS data)

Graduation Year	Dentistry		U15 Dentistry		UofT All Disciplines	
	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.
Quality of Teaching	3.63	3.39	3.70	3.38	3.85	3.85
Research Training & Career Orientation	2.94	2.96	2.65	2.72	2.84	2.84
Supportive Dissertation Advisor	3.36	3.31	3.49	3.14	3.29	3.29

(where 1 = 'Poor' and 5 = 'Excellent')

Data from the Canadian Graduate & Professional Student Survey (CGPSS) shows high levels of satisfaction in response to the question, "Overall, how would you rate the quality of your graduate program at the University?" (Table 3.15).

Table 3.15: Responses to "Overall, how would you rate the quality of your [M.Sc. or Ph.D.] graduate program at the University?" (2013 CGPSS data)

	Dentistry % (n)		U15 Dentistry % (n)		UofT All Disciplines % (n)
	M.Sc.	**Ph.D.**	**M.Sc.**	**Ph.D.**	**All M.Sc. and Ph.D.**
Excellent	33.3 (13)	11.1 (2)	31.8 (7)	0 (0)	26.1 (981)
Very Good	30.8 (12)	27.8 (5)	22.7 (5)	4.29 (3)	37.5 (1,408)
Good	20.5 (8)	27.8 (5)	18.2 (4)	28.6 (2)	23.1 (868)
Fair	5.1 (2)	11.1 (2)	27.3 (6)	28.6 (2)	9.4 (355)
Poor	10.3 (4)	22.2 (4)	0.0 (0)	0 (0)	3.9 (145)

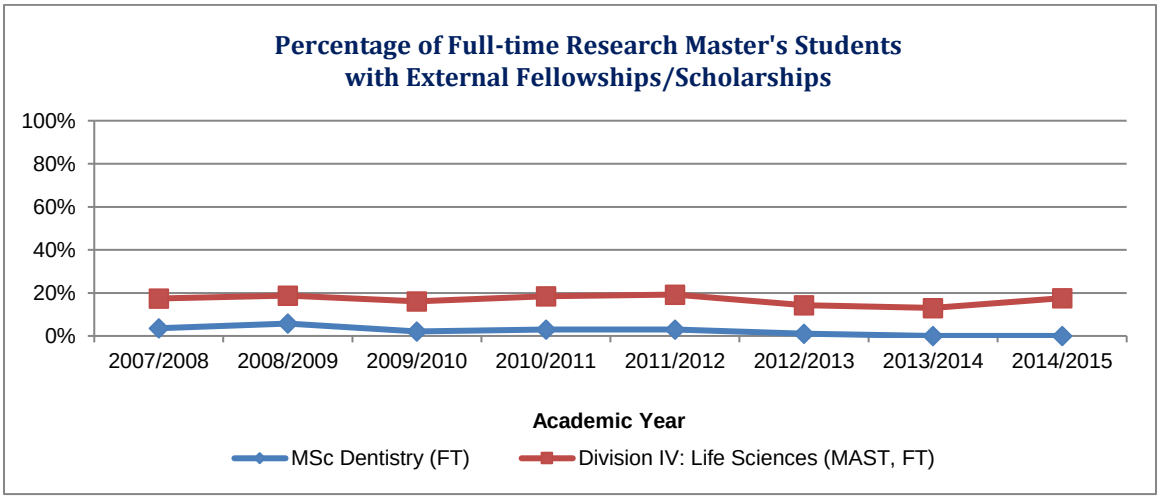
Student Awards

The Faculty of Dentistry has numerous awards for students that recognize both academic and extracurricular achievement. These are found in our Calendar (see Appendix 9).

Financial support is available to graduate students. The following table shows the most recent data in this regard:

Table 3.16: Research Master's Students with Financial Support

	MSc Dentistry (FT)			Division IV: Life Sciences (MAST, FT)		
Academic Year	Students with Fellowships/ Scholarships	All Students	% with Fellowships/ Scholarships	Students with Fellowships / Scholarships	All Students	% with Fellowships/ Scholarships
2007/2008	3	84	3.6%	186	1,068	17.4%
2008/2009	5	87	5.7%	198	1,055	18.8%
2009/2010	2	97	2.1%	168	1,043	16.1%
2010/2011	3	101	3.0%	199	1,081	18.4%
2011/2012	3	101	3.0%	214	1,114	19.2%
2012/2013	1	101	1.0%	158	1,105	14.3%
2013/2014	0	97	0.0%	145	1,114	13.0%
2014/2015	0	89	0.0%	197	1,120	17.6%



Graduation and Employment Rates

Data specific to employment rates of graduates from the graduate programs are below. The most recent data are from 2011.

Table 3.17: Graduate Employment Rates Six Months after Graduation by Institution

	2004	2005	2006	2007	2008	2009	2010	2011 employed+offered employment	2011
Toronto	100.0%	x	x	x	100.0%	100.0%	100.0%	25	96.2%
Western	x	100.0%	x	x	x	100.0%	100.0%	12	100.0%
Province	100.0%	100.0%	100.0%	94.4%	100.0%	100.0%	100.0%	37	97.4%

Table 3.18: Graduate Employment Rates Two Years after Graduation by Institution

	2004	2005	2006	2007	2008	2009	2010	2011 employed+offered employment	2011
Toronto	100.0%	x	x	x	100.0%	100.0%	100.0%	27	100.0%
Western	x	100.0%	x	x	x	93.3%	100.0%	12	100.0%
Province	100.0%	100.0%	100.0%	100.0%	100.0%	97.4%	100.0%	39	100.0%

Notes:

1) Data Source: 2013-14 Ontario University Graduate Survey.

2) To ensure respondent's confidentiality, where response counts are less-than or equal-to 10 data is displayed as "x".

http://www.iaccess.gov.on.ca/OSAPRatesWeb/en/index.html

Quality Enhancement

As discussed in the section on the D.D.S. program, the 2014-19 Strategic Plan identified a number of areas for improvement of the learning and teaching environment. The Direction of *Enriching Our Educational Programs through Innovation and Scholarship* had several goals with this intention. Of relevance to the graduate programs are:

Goal 1-2: Strengthen teaching across all programs
Goal 1-3: Establish new educational program options

In the first year of the plan (2014-15), the following priorities were of relevance to the graduate programs:

- Priority Action #2: *Assess needs regarding teaching quality and develop programs to outline and implement interventions.*

In the second year of the plan (2015-16), the following priorities were of relevance to the graduate programs:

- Priority Action # 3*: Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*
- Priority Action #4: *Explore sustainability of existing graduate programs and feasibility of new educational program options, such as new AEGD, new Masters, etc.*

For the third year of the plan (2016-17), the following are priorities related to enhancing the quality of the D.D.S. program that are being pursued:

- Priority Action #1: *Renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment*.
- Priority Action #2: *Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*.

Challenges and Opportunities

Recent faculty retirements have allowed the Faculty to embark on a plan to attract and hire a new cohort of junior faculty with the appropriate qualifications to accept graduate students. Limited infrastructure and financial resources, however, often limit the numbers of students (from the funded cohort) that a faculty member can accept into his or her laboratory. However given sufficient funding and space, the Faculty of Dentistry is in an excellent position to increase its graduate student enrollment for Ph.D. students.

The recruitment and retention of qualified full-time faculty with both research and clinical specialty credentials continues to be a challenge. A major confounder is the significant gap between private practice income for dental specialists and academic salaries. As a result, the didactic and clinical components of some graduate program are largely delivered by major part-time or sessional instructors who may have conflicting philosophies.

A challenge for the M.Sc. and Ph.D. with dental specialty training programs has been the rise of graduate specialty programs in other parts of Canada and in the United States, which may have greater graduate student capacities. And given the cost of living in the Greater Toronto Area, potential students may choose to enter programs located in less costly centres. And while some U.S. programs offer stipend funding during specialty training, the Graduate Department of Dentistry does not, which puts our programs at a disadvantage. There are only 2 exceptions to this, as the programs in Oral and Maxillofacial Pathology and Oral Medicine, and Oral and Maxillofacial Surgery do have funding for their residents through the Ministry of Health and Long-Term Care. Finally, there is a need for the Graduate Department to innovate new programs that may offer greater flexibility in terms of both scope and breadth for applicants. Unless consideration is given to improved flexibility, the Graduate Department's offerings may be seen as being out-of-date and failing to recognize the changing demographics and needs of applicants.

A challenge for our non-specialty stream graduate program is that, although the Faculty has excellent research opportunities, undergraduate students may not be fully aware of the scope of these opportunities in relation to oral health sciences, beyond dentistry itself. . As the Faculty of Dentistry is physically removed from the main campus, increasing our visibility and presence across the University could be improved through various forms of

engagement, including social and academic events with undergraduate colleges, increased visibility during orientation and recruitment events, and the teaching of undergraduate courses for other Faculties. In regard to the latter, we are currently pursuing the development of an undergraduate course for the Faculty of Arts and Science to improve inter-Faculty collaboration.

GRADUATE SPECIALTY PROGRAMS

The M.Sc. and Ph.D. degree programs with concurrent specialty training are described in detail below. There are 10 specialty programs and graduates receive either an M.Sc. in that specialty, or a Ph.D. with documentation confirming completion of that specialty program.

Dental Anaesthesia

Curriculum and Program Delivery

The graduate specialty program in Dental Anaesthesia consists of a 3 year Master of Science (M.Sc.) graduate program with the following learning outcomes:

1. Assess and manage patients who require sedation or anaesthesia for dentistry with a level of competence and training meeting or exceeding the accepted standards of dental specialty practice.
2. Have the skills for life-long learning, for critical evaluation of the literature, and for the evidence-based practice of anaesthesia.
3. Become educators and researchers in the field of anaesthesia for dentistry.

Graduates will be able to:

1. apply the requisite knowledge of the sciences relevant to anaesthesia in preparing and implementing an anaesthetic plan.
2. perform pre-operative risk assessment to identify medical conditions or practice limitations requiring consultation and/or referral of the patient.
3. perform all sedation and general anaesthetic techniques for both adult and pediatric dental patients; this includes oral and nasal endotracheal intubation, as indicated, as well as use of all appropriate monitoring techniques and equipment.
4. provide anaesthetic management for the special-needs dental patient.
5. manage anaesthetic emergencies at a skill level at or above that of Advanced Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS).
6. manage anaesthesia-related problems in post-anaesthetic recovery.
7. perform and teach the full spectrum of local anaesthetic techniques required for dentistry.
8. critically evaluate the research literature pertaining to anaesthesia in dentistry.
9. plan and carry out research relevant to anaesthesia.

Dental Anaesthesia is a recognized clinical specialty in Ontario by the Royal College of Dental Surgeons of Ontario. As a specialist community, dentist anaesthesiologists are expected to be able to provide sedation services for adult and pediatric patients with unique concerns such as anxiety, poor cooperation, extensive treatment needs, and/or medical complexity. These patient groups are typically underserviced by the general dentistry community. The program provides clinical experiences which systematically expose residents to these patient populations, in preparation for a specialist clinical

practice. Furthermore, clinical rotations at the Faculty and Sunnybrook Hospital in anaesthesia provide residents with exposure to not only hospital-based anaesthesia but ambulatory office-based anaesthesia, which is the practice reality for most dentist-anaesthesiolgists upon graduation. This is notable as the training for the hospital environment provides exposure to techniques and safety practices in the medical anaesthesia environment, but does not inform trainees of the possible resource constraints in the environment of dental office-based settings. Currency in the area of study is assisted by resident participation in the longitudinal didactic course "Fundamentals of Dental Anaesthesia" (see course description). In this course, critical appraisal of recent publications in medical and dental anaesthesia, as well as related fields of pharmacy, emergency medicine, and dentistry, provides a window into innovations and trends in best clinical practices.

The program requirements and learning outcomes are aligned with the degree level expectations and are formally conveyed at graduate student entry into the Dental Anaesthesia program. Written program requirements and learning outcomes are distributed to the students, and reviewed as a lecture during orientation week. In addition, prior to the completion of their orientation, students meet with the director to discuss their individualized learning and research plans.

The program is divided into approximately 24 months of clinical training and 12 months of research. The didactic program is designed to support learning in clinical rotations, foster critical thinking and reflective practice, develop research acumen, and provide pedagogical support for teaching activities. The didactic program also functions to support students who which to complete the American Dental Board of Anaesthesia (ADBA) Diplomate exam, which is required for application for specialty status by the Royal College of Dental Surgeons in Ontario. This is accomplished through a strong foundation in basic and applied sciences in the areas of anatomy, physiology, and pharmacology as they apply to anaesthesia practice.

The teaching facilities for this program are provided by the combined resources of the in the Faculty of Dentistry and the Department of Anaesthesia, Faculty of Medicine. Clinical training is provided both in the Faculty and at teaching hospitals affiliated with the University. Our current hospital partnerships include Toronto East General Hospital, Sunnybrook Health Sciences Centre, the Hospital for Sick Children, and Mackenzie Health.

The program's requirements are summarized below, and the Appendix 11.

Dental Anaesthesia Program Structure

Year 1	Year 2	Year 3
First Term Research Ethics (DEN1010H) Introduction to Biostatistics (DEN1015H) Basic Principles of Anaesthesia (DEN1055H) Basic Concepts in Clinical Medicine (DEN1056Y) Medical Anaesthesia Seminars I (DEN1071Y) Dental Anaesthesia Graduate Seminars (DEN1073Y) Foundations of Medicine as Applied to Dental Anaesthesia (DEN1074Y) General Anaesthesia for Medical Procedures – Adult I (DEN1076Y) General Anaesthesia for Dental Procedures – Adult I (DEN1078Y) Experiences in Clincal Teaching I (DEN1084H) Fundamentals of Dental Anaesthesia I (DEN1087Y) Research (RST9999Y) or Research Practicum (DEN1061H) *Second Term* Clinical Epidemiology and Evidence-Based Care (DEN1014H) Basic Concepts in Clinical Medicine (DEN1056Y) Medical Anaesthesia Seminars I (DEN1071Y) Dental Anaesthesia Graduate Seminars (DEN1073Y) Foundations of Medicine as Applied to Dental Anaesthesia (DEN1074Y) General Anaesthesia for Medical Procedures – Adult I (DEN1076Y) General Anaesthesia for Dental Procedures – Adult I (DEN1078Y) Experiences in Clincal Teaching I (DEN1084H) Fundamentals of Dental Anaesthesia I (DEN1087Y) Research (RST9999Y)	*First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y) General Anaesthesia for Medical Procedures – Pediatric (DEN1052Y) Dental Anaesthesia Journal Review II (DEN1058Y) Medical Anaesthesia Seminars II (DEN1072Y) General Anaesthesia for Medical Procedures – Adult II (DEN1077Y) General Anaesthesia for Dental Procedures – Adult II (DEN1079Y) Experiences in Clinical Medicine (DEN1083Y) Experiences in Clinical Teaching II (DEN1085H) Fundamentals of Dental Anaesthesia II (DEN1088Y) Local Anaesthesia for Dental Procedures (PDE9069H) Clinical Conferences (PDE9094Y) Research (RST9999Y) or Research Practicum (DEN1061H)	*First and Second Terms* *Seminars in Oral Health Sciences (DEN1001Y)* *General Anaesthesia for Medical Procedures – Pediatric (DEN1052Y) – if not taken in Yr 2* *Dental Anaesthesia Journal Review III (DEN1059Y)* *General Anaesthesia for Dental Procedures – Pediatric (DEN1075Y)* *General Anaesthesia for Medical Procedures – Adult II (DEN1077Y) – if not taken in Yr 2* *General Anaesthesia for Dental Procedures – Adult II « (DEN1079Y)* *Experiences in Clincal Teaching III (DEN1086H)* *Fundamentals of Dental Anaesthesia III (DEN1089Y)* *Local Anaesthesia for Dental Procedures (PDE9069H)* *Clinical Conferences (PDE9094Y)* *Research (RST9999Y) or Research Practicum (DEN1061H)*

The clinical program is composed of time-based rotations in specific experiences aimed to facilitate achievement of program requirements and learning outcomes. Clinical experience includes 8 months rotation at the Faculty of Dentistry and Sunnybrook Health Sciences Centre Department of Dentistry providing deep sedation/GA cases on adult dental patients in our clinic. It is expected that 12 months will be spent with the Department of Anaesthesia at one of the teaching hospitals. This currently is comprised of 8 months at Toronto East General Hospital and 4 months at the Hospital for Sick Children. Residents return to the Faculty for a 6-month period to administer general anaesthetics on pediatric dental patients. A 2-month rotation in Team Medicine takes place at Sunnybrook Health Science Centre. To further complement didactic teaching in this area, a longitudinal elective in Emergency Medicine is now being piloted at Mackenzie Health. Students may also opt to participate in short 2-week electives in the following areas, depending on research progress: Rapid Response Team (Sunnybrook Health Sciences Centre), Mount Sinai Wasser Pain Clinic (Mount Sinai Hospital), Respirology or Cardiology (Toronto General Hospital). Each student completes a course in the adult ACLS (Advanced Cardiac Life Support) course successfully within their first year. Resident subsequent complete a course in PALS prior to their participation in pediatric care.

Efforts have also been made to incorporate novel evidence-based educational methods in content delivery. Based on a cognitive science concept known as test-enhanced learning, the didactic course “Basic Principles of Dental Anaesthesia” has been constructed to use testing specifically to enhance learning and retention of information. The structure of the course includes an overlapping and sequential series of oral and written examination to assist in long-term retention of basic science concepts in anatomy and physiology that are fundamental to the clinical practice of dental anaesthesia. In future, pedagogical innovations could be embedded in additional courses to provide quality and high-yield teaching experiences for residents.

The approach to curriculum delivery in dental anaesthesia consists of an emphasis on supported self-directed learning. Students are encouraged to identify knowledge gaps and seek mentorship from both peers and faculty to meet their learning outcomes. Discourse and challenge is encouraged in didactic and clinical spaces to stimulate a critical, reflective practice. These approaches to learning set an academic climate which facilitates the achievement of learning outcomes. In particular, it encourages students to exceed accepted standards of dental specialty practice, promotes skills for life-long learning, evidence-based practice, and critique of research in the discipline, which prepares them to appraise and adapt new approaches to practice as they arise throughout their careers. This promotes a level of expertise that additionally allows residents to return to participate as educators, either in graduate program clinical instructor or as faculty, as well as dental continuing education courses.

Recent improvements to our curriculum delivery include the use of simulation bi-annually to provide residents with experiences in anaesthesia emergencies that they may otherwise not encounter. These in-situ team simulations are focused on not only clinical content, but additionally environmental and team factors. The consistent delivery of simulation longitudinally across the program is an area of innovation that is likely to expand in future.

One potential concern in delivery is our time-based model of clinical curriculum delivery. Residents participate in rotations at various Faculty and hospital sites for specific blocks of time. Given recent developments in health professions education to transition from time-based to competency-based models, the delivery of our clinical program is worth reflection. Certainly, restructuring the dental anaestheisa program to a competency-based model would be a complex process involving multiple partners. One benefit of the current structure of our clinical rotations is the longitudinal nature of rotations at specific sites. This longitudinal approach is reflected in courses "General Anaesthesia for Medical Procedures" – "Adult I" and "Adult II", and "General Anaesthesia for Dental Procedures" – "Adult I", "Adult II". These courses respectively represent two separate four month blocks in at the Toronto East General hospital site (block 1 in year 1 and block 2 in year 2 or 3) and two separate blocks at the Faculty/Sunnybrook Department of Dentistry sites (6-month block in year 1 and subsequent 1-month blocks in year 2 and year 3). The separate, formal assessment of these clinical activities over time allows a formal indication of resident progress, as they encounter the same evaluators in these rotations.

Our program has been strengthened by providing students with formal education in pedagogy and clinical teaching experiences. These experiences take residents outside of their own classroom environment and allow them to experience the role of the instructor. Residents are prepared for this teaching role by the longitudinal course "Experiences in Clinical Teaching", which provides annual instruction in pedagogy and teaching skills in workshop format. Residents subsequently act as facilitators and clinical supervisors in a variety of contexts. These teaching experiences provide an opportunity for reflection on their own receptivity to learning, and insight into strengths and weakness as their knowledge is challenged by students' questions.

Assessment of Learning

While assessment in the Dental Anaesthesia program consists of both formative and summative feedback, our emphasis is on multi-modal formative feedback. This feedback is provided at regular intervals throughout the Dental Anaesthesia training program, with a focus on timely individualized feedback. Our multi-modal assessment consists of the following:

1. Resident Portfolio Review. Residents meet for a 30-minute interview with the Program Director twice yearly, in December and June. All program assessments are discussed at this meeting, therefore program expectations and progress are formally conveyed to the students at this time. The focus of the interview is to provide individualized critique of student academic, clinical, and research performance in the program. These meetings create a space for early identification of students who are not meeting expectations, and provides opportunities for students to become aware of deficits and discuss any need for remediation. This is also an opportunity to receive feedback from the student about their program experiences.
2. Evaluations of Individual Patient Care Encounters. Residents are provided with an evaluation of each patient care encounter using a global rating scheme of

assessment of knowledge, skills, and attitude. These evaluations are shared discussed with residents on a daily basis at the end of the clinical care day. The evaluations are collected and provided to the Program Director for formal review at the bi-annual portfolio reviews.

3. Informal Instructor Feedback. Beyond patient care evaluations, discussion of resident performance is sought informally throughout the year from individual clinical instructors by the Program Director. Resident performance is also discussed at year-end clinical instructor staff meetings, where clinical instructors have an opportunity to discuss their resident teaching encounters with each other and triangulate their experiences with different residents. The program director acts on these discussions by relaying this feedback to residents, and if recommended, makes plans for remediation based on instructor feedback.
4. Resident Logs. Patient care encounters are detailed by residents formally in an electronic tracking system. The total number and diversity of patient care encounters is reviewed by the program director with residents to ensure they meet accreditation standards. Residents can also be directed to seek specific experiences in their time-based rotations which can fill gaps in patient exposures that relate to learning objectives and outcomes.
5. Anaesthesia Rounds. Embedded in the core course "Fundamentals of Dental Anaesthesia" is a program of clinical rounds. Residents lead clinical care case presentations for the evaluation of their peers and clinical staff. These case presentations vary in their content from review of a quality care encounter to morbidity and "near-miss" instances.
6. Simulation Experiences. Twice yearly residents participate in in-situ team simulations in the Faculty of Dentistry clinical spaces. Simulations are recorded to allow video-assisted debrief for rich discussions of content and team performance.
7. Mock Written Board Examination. Once yearly in February, residents participate in a mock written board examination. This examination is administered by the American Dental Board of Anaesthesia. Residents receive a detailed statistical analysis of their performance compared to peers across North America, as well as breakdown of individualized strengths and weaknesses in question categories.
8. Oral Examination. Twice yearly residents are assessed through oral examination by a panel of staff examiners, with similar content range and exam conditions to the American Dental Board of Anaesthesia specialty board examination. Residents receive both a letter grade and written critique on their exam, which includes comment on both content and examsmanship. These oral examinations are embedded in the course "Fundamentals of Dental Anaesthesia" and contribute to the overall grade in this course.
9. Use of Letter Grading Systems. In the past several years, the dental anaesthesia coursework has been re-organized, and included revising grading systems for SGS courses from Credit/Non-credit to Letter Grades wherever possible. As a summative assessment, this provides a clear indication of student achievement in didactic and clinical courses.

This multi-modal assessment program, focused on early, formative feedback provides an ongoing record of resident progress. Through this documentation which occurs throughout training, by the final year of the program, residents have a portfolio of physical records of activities and related assessments that clearly demonstrate achievements corresponding to the learning objectives and degree level expectations.

Another means of evaluating the extent to which the goals and objectives are met by our final year students is by noting our residents' success at taking Dental Anaesthesia Board written and oral examinations. Although this qualification is not required to provide deep sedation/general anaesthesia for dental procedures, it is required to register as a clinical specialist in dental anaesthesia in Ontario. All dental anaesthesia graduates (16 total) since 2007 have been successful in examination and received this ADBA qualification. This success may be interpreted as the program having met its goals and objectives.

Dental Public Health

Curriculum and Program Delivery

The graduate specialty program in Dental Public Health is the only such program in Canada. The program is a minimum of two consecutive academic years in length, or four consecutive academic years on a part time basis. The program's requirements (below and Appendix 11) and associated learning outcomes are based on the CDAC's core and applied competencies.

Dental Public Health Program Structure

Year 1	Year 2
First Term Dental Public Health Seminars (DEN1006Y) Research Ethics (DEN1010H) Introduction to Biostatistics (DEN1015H) Oral Epidemiology (DEN1051Y) Clinical Conferences (PDE9094Y) Thesis/Research (RST9999Y) Approved Option I* Option in Health Promotion* *Second Term* Dental Public Health Seminars (DEN1006Y) Clinical Epidemiology and Evidence-Based Care (DEN1014H) Oral Epidemiology (DEN1051Y) Practicum in Dental Public Health (DEN1063Y) Clinical Conferences (PDE9094Y) Thesis/Research (RST9999Y)	*First Term* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Clinical Conferences (PDE9094Y) Thesis/Research (RST9999Y) Approved Option II* Approved Option in Health Policy, Health Economics* *Second Term* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Management Principles in Canadian Dental Health Organizations (DEN1064H) Clinical Conferences (PDE9094Y) Thesis/Research (RST9999Y)

* *A list of options is compiled for student selection. Other courses can be arranged according to the student's interest through the Graduate Specialty Program Director of the Program and the Associate Dean, Graduate Education. Courses are given by the Faculty of Dentistry and by other university units such as the Dalla Lana School of Public Health and the Institute of Health Policy, Management and Evaluation, University of Toronto.*

The program requirements and learning outcomes are conveyed through a series of courses, a practicum placement (normally a minimum of 14 weeks in a public health agency supervised by a dental public health specialist), and a thesis.

Importantly, the program does not solely focus on training dentist specialists, and has broadened its focus to train dental hygienists as well. Additionally, it provides M.Sc. and Ph.D. degrees to dentists and non-dentists interested in dental public health areas generally. Whatever the case, graduates from the program work as academics in universities, as policy advisors and program administrators in government (e.g. Chief Dental Officer, Public Health Agency of Canada; Senior Oral Health Advisor, Government of Ontario; Dental Director, Toronto Public Health) and/or in international, national, provincial, and local non-governmental agencies (e.g. World Health Organization; Canadian

Dental Association; Public Health Ontario; Provincial Dental Regulatory Authorities; Provincial Dental Associations).

Importantly, the research being undertaken in the program and the program's curriculum reflect what is state-of-the-art in the specialty and practice of Dental Public Health. From a research perspective, much of the research conducted by the faculty and its students is consistently published in the top Dental and other public health journals. In terms of the curriculum, it is revisited and adjusted yearly to reflect developments in the field. To be sure, through the program's practicum placements, the strong relationships that the faculty have with the field, and the fact that active Dental Public Health practitioners are faculty members, new ideas are implemented regularly that reflect the needs of the discipline in both a theoretical and applied sense.

Ultimately, given that it is the only program of its kind in Canada, it is through interactions with Dental Public Health practitioners in a variety of settings that the program remains fresh, creative, and innovative. This is reflected in the fact that government and non-governmental agencies routinely approach the program to conduct research, program evaluations, and quality improvement projects on their behalf. Recently, for example, the Ontario Ministry of Health and Long-Term Care asked the program to help them in their effort to amalgamate the province's 6 children's dental care programs into one program, to undertake a resource allocation and priority setting exercise to determine the services that the new program would cover, and to be a partner in evaluating the new program. This resulted in significant funding, in numerous thesis and course projects for students, and in various case studies for analyses in the program's courses. It also exposed students to learning opportunities beyond the classroom, as they attended off-site meetings associated with the project, where they observed the real challenges and scenarios that they will face daily as Dental Public Health specialists and practitioners. It is this type of funding that also gives students opportunities to travel and present their research at local, national, and international conferences.

Assessment of Learning

Assessment of students is undertaken through written and oral examinations, major course projects, practicum report(s), and a written thesis and its oral defence. Outside of course assessments, it is in developing thesis projects that significant developmental milestones are met (e.g. finalizing a proposal and ethics review submission, liaising with community partners if needed, thesis writing and oral defence). In the final year of the program, and informal study group to prepare students for the NDSE is established and supported. This involves regular meetings with the core faculty, and workshops from Dental Public Health specialists in specific areas (e.g. data analysis, program evaluation). It is in passing courses, successfully defending their theses, and passing the NDSE that students demonstrate achievement of the program learning objectives and the program's Degree Level Expectations.

Endodontics

Curriculum and Program Delivery

The graduate program in Endodontics is designed to provide students with opportunities to acquire excellent clinical skills and comprehension of the underlying biology. Its components include (i) patient care, providing all aspects of endodontic treatment, (ii) topic-specific and current literature seminars, (iii) clinical conferences, (iv) core curriculum courses, (v) off site rotations (when available), (vi) research at the M.Sc. level, including application for funding, preparation of manuscripts for publication, presentation at national and international research forums, and (vii) guest lectures. Great emphasis is placed on self-learning in all of the program's components. Students are encouraged to identify research topics, related to endodontic science or any other dental or non-dental scientific area. Students are expected to join the Ontario Society of Endodontists, the Canadian Academy of Endodontics and the American Association of Endodontists.

The M.Sc. Endodontics program has the following aims and objectives in its didactic, clinical and research activities:

1. Attract first-class scholars and clinical teachers who have demonstrated ability and achievement in research, education and clinical practice.
2. Attract outstanding and highly motivated graduate students.
3. Educate endodontists with career goals in academics, clinical practice, and community service.
4. Foster quality innovative research that elucidates the biology of endodontic diseases and that improves diagnosis and therapy for these diseases.
5. Foster in the students a commitment to lifelong learning, excellence and professionalism.
6. Provide for students challenging and current educational programs emphasizing the acquisition of knowledge, technology and clinical skills, creative thinking, critical inquiry and analysis, and problem solving.
7. Foster cooperation, collaboration, collegiality and loyalty among the program teachers and students, and among the program graduates.
8. Foster cooperation, collaboration and allegiance between the program students and organized endodontics groups, including the Ontario Society of Endodontists, George Hare Endodontic Study Club, Canadian Academy of Endodontics and American Association of Endodontists.
9. Foster philanthropic attitudes among the program students by encouraging them to pledge donation to groups supporting the program and the specialty of endodontics, including the University of Toronto Endodontic alumni and Friends, The Canadian Academy of Endodontics Endowment and the American Association of Endodontists Foundation.
10. Provide educational opportunities for Alumni and other persons in professional practice and other institutions.

The graduate program in Endodontics has been strongly engaged in clinical and fundamental research for more than 20 years. Research has been an important component

of the graduate program in Endodontics, and it is the major component of faculty scholarly activity. Over the years, the research published cumulatively by faculty and students in Endodontics consolidates the Toronto group's position as a constant and important contributor to endodontic science and clinical knowledge. The current research focus areas include:

1. Clinical research: epidemiology, treatment outcomes
2. Root canal irrigation: agents, delivery methods
3. Root canal instrument properties
4. Disease and treatment mediated dentin tissue changes
5. Bacteria-host tissue interaction
6. Advanced antibiofilm & regenerative strategies
7. Photodynamic therapy and nano-biomaterials

This program was established in 1993, and at the time, it was the only graduate program in Endodontics in Canada. Over the years, the faculty has expanded from one full-time and one part-time faculty member to the present complement of 4 full-time and 1 part-time faculty members. Through extensive negotiations with donors and providers on the part of the discipline head, a state of the art clinical facility was built for the graduate endodontics program in 1997, and digital radiography systems as well as new clinical microscopes were acquired for the graduate endodontics clinic in 2010. In parallel, a new small-view cone-beam CT imaging system was installed in the Oral and Maxillofacial Radiology clinic, which provides advanced imaging services to the graduate students.

The program's requirements are summarized below, and the Appendix 11.

Endodontics Program Structure

Year 1	**Year 2**	**Year 3**
First Term Anatomy (DEN3005H) Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Introduction to Biostatistics (DEN1015H) Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H) Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Topical Literature (DEN5002Y) Graduate Endodontics Current Literature (DEN5003Y) Introduction to Graduate Endodontics (DEN5005H) Endodontic Clinic (PDE9091Y) Clinical Conferences (PDE9094Y) Research (RST9999Y)	*First Term* Investigating Pathogenic Biofilms (DEN1022H) Oral Physiology: Sensory & Neuromuscular Function (DEN1060F) Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Topical Literature (DEN5002Y) Graduate Endodontics Current Literature (DEN5003Y) Single Tooth Replacement with Implant Supported Prosthesis (DEN5004Y) Endodontic Clinic (PDE9091Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) *Second Term*	*First Term* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Toronto Public Health dental clinic rotation Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Current Literature (DEN5003Y) Endodontic Clinic (PDE9091Y) Research (RST9999Y) *Second Term* Master's Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Toronto Public Health dental clinic rotation Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Current Literature (DEN5003Y)

Second Term Oral & Maxillofacial Pathology (DEN1002S) Clinical Epidemiology and Evidence-Based Care (DEN1014H) Pharmacology of Dental Therapeutics (DEN1062H) Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Topical Literature (DEN5002Y) Graduate Endodontics Current Literature (DEN5003Y) Endodontic Clinic (PDE9091Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) Teaching (in the undergraduate preclinical endodontics course)	Temporomandibular Disorders* (DEN1017H) Graduate Endodontics Case Presentations (DEN5001Y) Graduate Endodontics Topical Literature (DEN5002Y) Graduate Endodontics Current Literature (DEN5003Y) Endodontic Clinic (PDE9091Y) Clinical Conferences (PDE9094Y) Teaching (in the undergraduate preclinical endodontics course) Research (RST9999Y) *Available in alternate years	Endodontic Clinic (PDE9091Y) Research (RST9999Y) Teaching (in the undergraduate preclinical endodontics course)

The faculty and students have established an international reputation in the endodontic community through extensive publication, invited lectures and winning major awards and prizes. A recently recruited member of the professorial staff with a doctorate in bioengineering as well as a dental degree has expanded the scope of research in the discipline, opening up new avenues for graduate students.

Recently, through a cooperative arrangement with the periodontics discipline, implant dentistry has been added to the graduate endodontics program's curriculum. This recognizes the expanded scope of endodontic practice and keeps the University of Toronto program on a par with the leading programs in the United States.

The graduate program in Endodontics is unique providing current literature seminars centered on topics rather than on journals or arbitrary articles, as is done in all other programs. Furthermore, we take a unique approach to topical literature, again focusing on topics rather than on "classic literature" reviews. We emphasize current concepts rather than on dwelling on classic or historic literature as background for the current concepts. Finally, we collaborate with other graduate specialty programs in the areas of oral and maxillofacial radiology and dental implants.

We believe in interactive learning and teaching experiences. The delivery of the knowledge, during seminars is always with active learning. All the students are coming to class with previous assigned tasks and they are asked to either critique a paper or prepare a presentation. The effectiveness in meeting the program's learning outcomes are evaluated in class and in several tests during the year.

Assessment of Learning

Students are monitored closely to evaluate their progress. In the clinical setting, the students are supervised by clinical specialists in Endodontics. In addition, all the students are evaluated on all their cases with a full-time faculty member for feedback and grading, ensuring that all the clinical cases are by a clinician and a full-time faculty member. In this way, the students have the opportunity to discuss the evidence behind the treatment.

All didactic components are continuously evaluated in the form of a written or oral exam. For example during case presentations, students present a case and answer questions related to the case. At the end of this course, students challenge an oral exam. For the current literature course, the students are asked to critique a research paper and at the end of the course, the students challenge a written exam. For the topical literature seminars, students are given historical papers to summarize and at the end of the course, a written exam is given to the students.

Oral & Maxillofacial Pathology and Oral Medicine

Curriculum and Program Delivery

The objective of the Oral & Maxillofacial Pathology and Oral Medicine program is to maintain national leadership as an accredited graduate program in specialty education in the joint disciplines of Oral & Maxillofacial Pathology and Oral Medicine, by producing graduates who are educated in both disciplines, capable of successful completion of the National Dental Specialty Examinations and who can advance the fields of Oral & Maxillofacial Pathology and Oral Medicine through innovative teaching and research and exemplary patient care.

The curriculum is designed to meet the educational requirements published by the Commission of Dental Accreditation of Canada. This includes coursework and rotations that address the educational needs of the "core" program common to Oral & Maxillofacial Pathology and Oral Medicine and the specific elements necessary to achieve competence in each of the 2 disciplines. The curriculum is enriched by the requirements for completion of a research project leading to an M.Sc. or Ph.D. degree.

A large part of the teaching and learning in this program occur in the university-affiliated hospital departments in related disciplines. These include a year-long rotation in Anatomic Pathology in the Faculty of Medicine, rotations through Oral Medicine clinics, multidisciplinary Mouth Clinic, Pain Clinic, Hospital Dentistry, Oncology and Otolaryngology. The partnership with teaching hospitals enables the delivery of the curriculum and also emphasizes the importance of interdisciplinary collaboration and provides insight into the relationship between oral health and systemic health.

The program's requirements are summarized in the Table below, and Appendix 11.

Oral & Maxillofacial Pathology and Oral Medicine Program Structure

Year 1	**Year 2**	**Year 3**	**Year 4**
First Term Research Ethics (DEN1010H) *First and Second Terms* General and Special Pathology for Residents (LMP1005Y)* *For M.Sc. (Oral & Maxillofacial Pathology) and M.Sc. (Oral & Maxillofacial Pathology and Oral Medicine) students.	*First Term* Oral Radiology (DEN1007F) *Second Term* Oral Pathology (DEN1002S) Clinical Epidemiology and Evidence-Based Care (DEN1014H) *First and Second Terms* Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y)	*First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y) Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y) Research (RST9999Y)	*First and Second Terms* Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y) Research (RST9999Y)

	Introduction to Biostatistics (DEN1015H) Basic Concepts in Clinical Medicine (DEN1056Y) Foundations of Medicine (DEN1074H) Research (RST9999Y)		

The following are the learning outcomes of the program (adapted from the Commission on Dental Accreditation of Canada, 2010 and 2012):

Core Competencies for the Oral & Maxillofacial Pathology and Oral Medicine Combined Program:

The graduating student will be able to:

1. diagnose and provide primarily non-surgical management of patients with: oral mucosal disease, orofacial disorders arising from aging, systemic disease and medical therapies, diseases of the salivary glands;
2. understand the theory and practice of current imaging techniques for diagnostic purposes; understand the radiographic manifestation of diseases through the experience of interpreting an adequate volume and variety of cases;
3. diagnose and provide consultation regarding patients with diseases of the jaws that require surgical therapy;
4. develop and discuss treatment plans with patients and make recommendations based on a critical review of the literature;
5. Instruct pre-doctoral dental students on oral medicine and Oral & Maxillofacial Pathology topics.

Competencies for the Oral Medicine Program:

The graduating student will be able to:

1. diagnose and manage patients with orofacial pain and other neurosensory disorders;
2. understand the theory and practice of pharmacological treatment particularly in relation to the management of chronic pain, control of infection and management of mucosal disorders;
3. provide oral and dental care of patients with complex medical conditions that compromise oral tissues and affect dental treatment.

Competencies for the Oral & Maxillofacial Pathology Program:

1. interpret a wide range of biopsies based on experience with a sufficient volume and variety of cases through participation in a large biopsy service, study of teaching collections and attendance at seminars at which unusual or difficult lesions are discussed; correlate histologic findings with clinical presentation and findings on diagnostic imaging to render a definitive diagnosis;
2. diagnose and treat oral mucosal diseases, diagnose and manage oral manifestations of systemic disease in collaboration with other health care professionals, diagnose and participate in the management of oral and maxillofacial diseases where treatment is primarily surgical (e.g. tumors of bone and salivary glands);
3. collaborate with colleagues in related fields of patient care based on experience with working in anatomic pathology, forensic pathology and other selected areas such as dermatopathology, microbiology, molecular diagnostics;
4. perform, supervise and interpret laboratory tests for the tissue diagnosis of orofacial disease; direct or co-direct Oral & Maxillofacial Pathology laboratory personnel.

The most recently recruited faculty member has extensive research training and conducts basic and translational research in the mechanism of oral diseases. This has increased the opportunity for our students to learn to do research that relates to their field of study. Overall, this program provides a unique and integrated approach to advanced education in a dental specialty.

There have been significant advances in Oral & Maxillofacial Pathology and Oral Medicine in the past 5 years, particularly in the use of molecular diagnostic techniques (e.g. immunohistochemical staining, in-situ hybridization) and biological agents for treatment based on a better understanding of pathogenetic pathways. These advances require the resources of large health care institutions and it is increasingly important for the Oral & Maxillofacial Pathology and Oral Medicine program to establish and maintain linkages with these institutions. Through collaboration with the Department of Laboratory Medicine and Pathobiology, hospital pathology departments and research institutes and attendance at continuing education courses, we have kept abreast with advances in diagnosis and treatment of diseases and ensured that our program curriculum, clinic and laboratory operations are up-to-date and aligned with leading Oral & Maxillofacial Pathology and Oral Medicine programs.

Oral & Maxillofacial Pathology and Oral Medicine is a well-established but small area of specialization in Dentistry with a strong association with academic careers in universities and/or teaching hospitals. The graduate program here is a 4 year residency program funded by the Ministry of Health and Long Term Care, with one position available each year. The residency positions have been almost fully occupied for the past 5 years. Three of our 5 most recent graduates are/will be full-time, tenure stream Assistant Professors in universities across Canada. We are constantly aware of the challenges and opportunities involved in maintaining our leadership in graduate education in Oral & Maxillofacial Pathology and Oral Medicine. On the one hand, the changing demographics of the

population and emphasis on patient centered care have increased the need for dentists with advanced training in Oral & Maxillofacial Pathology and Oral Medicine. Some of our recent graduates have pursued a blended career with part-time private clinical practice and part-time teaching in university or university-affiliated hospital departments. We have developed initiatives to attract more qualified applicants to the program, by reaching out to undergraduate dental students, for example, through hospital dentistry rotations and summer research studentships. We are also setting up an Oral & Maxillofacial Pathology-Oral Medicine Graduate Student Research Fund to enhance opportunities for research in the graduate program. We continue to teach by example to our graduate students the importance of interdisciplinary collaboration, both within Dentistry and outside of Dentistry, to meet the healthcare needs of patients with complex orofacial disorders.

Assessment of Learning

Students are given the document 'Competencies for the Beginning Oral Medicine and Oral & Maxillofacial Pathology Specialist' from the Commission on Dental Accreditation of Canada, so that they are familiar with the goals of their graduate education program.

Performance in didactic courses: students are evaluated by the course directors, as follows:

1. Biannual assessment of clinical performance: The course director of the Oral Medicine course (DEN1012Y) collects the assessments of each student from all clinic heads who are involved with Oral Pathology and Oral Medicine rotations and meets with each student to discuss her/his level of knowledge, skills and attitudes in the context of progress towards a competent specialist. The student can also provide feedback on their learning experience to the staff.

2. Biannual assessment of performance in laboratory pathology: The course director of Advanced Seminars in Oral Pathology (DEN1011Y) collects the assessments of each student from staff who are involved with the biopsy service, based on the student's record of attendance, engagement in the sign-out process (generating biopsy reports, ordering additional stains, giving verbal reports as directed by staff, retrieving previous biopsies to review with the current biopsy etc), knowledge of histopathology and diligence in reading on relevant topics.

An annual graduate student examination follows the format of the National Dental Specialty Examination and consists of 3 components:

1. Individual Oral examination (panel of 4 - 5 examiners): 10 Unknown cases are presented to test the ability to analyze clinical and imaging data, formulate differential diagnoses, request additional investigations and information, render a diagnosis, manage the disease or disorder including complications.
2. Written examination (3 hours): Short and long answer questions on orofacial anatomy and physiology, mechanism of diseases, pharmacology and therapeutics,

general medicine, oral pathology, dental management of patients with complex medical conditions.

3. Histopathology examination (1.5 hours): 25 Unknown slides of oral and maxillofacial pathology.

The program director collects the assessments from the 3 components and meets with each student to discuss the examination results. The same examination is given to students in the 2nd, 3rd and 4th years of the program. For the 2nd the 3rd year students, the examination is used as a formative assessment to indicate the areas that need improvement and areas of strength that the student should maintain and build on. For the 4th year student, the departmental examination is used as summative assessment to indicate the outcome of the 4 year educational program.

Oral & Maxillofacial Radiology

Curriculum and Program Delivery

The program duration is a minimum of 35 months, and provides extensive experience in intra- and extra-oral radiography, sialography, multi-detector and cone beam computed tomography, and magnetic resonance imaging through patient contact in the Oral and Maxillofacial Radiology Special Procedures Clinic in the Faculty of Dentistry and during rotations through the Department of Medical Imaging at the Princess Margaret Hospital (Head & Neck Imaging) and the Sunnybrook Health Science Centre (Neuroradiology). Through formal didactic courses and seminars, the program emphasizes the impact that pathologic processes play in the appearances of diseases depicted on radiologic images; a feature unique to the educational experience at the University of Toronto. Radiology rounds conducted with medical radiology residents highlight the use of advanced imaging in the interpretation of abnormalities of the head and neck, and weekly small group seminars in image interpretation with the program faculty add strength to the diagnostic skills of students; an experience unique to the University of Toronto program. Radiation biology and physics, biostatistics and epidemiology, disorders of the temporomandibular joints and experience in undergraduate teaching are also integral components of the program.

The Oral & Maxillofacial Radiology graduate program stresses the importance of the design, acquisition and analysis of imaging examinations as they pertain to the interpretation of abnormalities of the face and jaws. Specifically, the learning objectives of the program are that students will be able to:

1. identify variations of normal anatomy on radiologic images.
2. identify the characteristic features of developmental and congenital abnormalities, acquired diseases and trauma on radiologic images, and to provide interpretations of these conditions.
3. provide radiologic consultation services to colleagues in general and specialty clinics for the diagnosis and management of abnormalities of the maxillofacial region.
4. obtain a patient history and provide a thorough clinical examination. With this information, the student will be able to prescribe appropriate radiologic examinations for unusual diagnostic problems (including advanced imaging in computed tomography, magnetic resonance imaging and contrast studies).
5. develop teaching competencies through rotations in the undergraduate oral and maxillofacial radiology clinic.
6. supervise support personnel in the production of images of high diagnostic quality and in the practice of radiation hygiene.
7. carry out radiologic procedures including intra-oral, panoramic and skull radiography, cone beam computed tomography, and sialography.
8. be able to acquire and image process cone beam CT images, and complete appropriate analyses of these image data.
9. liaise with medical colleagues in therapeutic and diagnostic radiology.

10. be self-motivated to continue to develop and improve his/her skills and knowledge in the specialty of oral and maxillofacial radiology.

The program's requirements are summarized in the Table below, and in Appendix 11.

Oral & Maxillofacial Radiology Program Structure

Year 1	Year 2	Year 3
First Term Oral Radiology (DEN1007F) Research Ethics (DEN1010H) *Second Term* Craniofacial Anatomy & Osteology (DEN2008Y) Temporomandibular Disorders (DEN1017S)* Clinical and Experimental Radiobiology *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y) Oral Surgical Pathology (DEN1013Y) Advanced Oral Radiology (DEN1094Y) Applied Physics Mini-Course Research (RST9999Y) *Offered in alternating years.	*First Term* Introduction to Biostatistics (DEN1015H) *Second Term* Clinical Epidemiology and Evidence-based Care (DEN1014) Temporomandibular Disorders (DEN1017S)* *First and Second Terms* Oral Surgical Pathology (DEN1013Y) Advanced Oral Radiology (DEN1095Y) Clinical Conferences (PDE9094Y) Applied Physics Mini-Course Research (RST9999Y) *Offered in alternating years.	*First and Second Terms* Advanced Oral Radiology (DEN1096Y) Applied Physics Mini-Course Research (RST9999Y)

An M.Sc. or Ph.D. degree in the Graduate Department of Dentistry is also completed as part of the program, and this involves the identification of a basic or clinical science, or educational research topic identified by the student as an area of interest. The research project is further refined in collaboration with a faculty member, and the work is examined in the form of a written thesis and oral defense. A course-based M.Sc. is also available. Exceptionally qualified candidates who have completed an M.Sc. degree may be considered for the Ph.D. degree.

The current state-of-the art in clinical practice incorporates fully digital two- and three-dimensional imaging systems in patient care. Specifically, the Faculty operates 2 cone beam CT systems capable of capturing three-dimensional volumes of human anatomy; a high resolution, limited field-of-view system (5 cm diameter field-of-view) and a large, full-head-size (up to 12" diameter field-of-view) system. During the course of the program, students develop competence in the operation of these systems as well as in processing of the three-dimensional image volumes and image interpretation. Patients are referred for imaging from practitioners inside the Faculty and from community-based practitioners allowing students to experience the breadth of imaging examinations from both a university- and community-based settings.

Since 2005, 100% of graduates of the University of Toronto's program in Oral & Maxillofacial Radiology have been successful in their first challenge of the National Dental Specialty Examination administered by the Royal College of Dentists of Canada. Furthermore, since 2005, every graduate who has challenged the certifying examination of the American Board of Oral and Maxillofacial Radiology has passed this examination on their first attempt; an accomplishment that has not been matched by any other program in North America.

Assessment of Learning

Clinical assessment is composed of two parts based on term performance and year-end examinations. Twice per year, in August and in February, term grade reports and comments are submitted for each of the following sections by faculty members:

Clinical performance: The student is continually assessed on their ability to perform a clinical exam, including history taking, and image prescription, acquisition and interpretation using the rubric, below. Components of this assessment will include the professional manner with which the student interacts with the patient and the general manner in which the student carries out his/her duties.

Letter Grade	
A+	Performance is acceptable and demonstrates a superior level of understanding. Unquestionably exceeds expectations.
A	Performance is acceptable and demonstrates a high level of understanding. Exceeds expectations.
A-	Performance is acceptable and demonstrates a very good level of understanding. Meets expectations.
B+	Performance is acceptable and demonstrates a good level of understanding. Expectations are met, but with minimal errors.
B	Performance is acceptable and demonstrates a satisfactory level of understanding. Expectations are met, but with sporadic errors
B-	Performance is acceptable and demonstrates a satisfactory level of understanding. Expectations are met, but with frequent errors.
F	Performance is unacceptable and demonstrates a complete lack of understanding. Unquestionably does not meet expectations. There are constant errors.

Performance in didactic coursework: Students are evaluated by individual course directors.

Year-end examination: A final year end image interpretation session is held in the late spring of each year to benchmark student performance. This examination is done orally, and consists of 10 image sets of disease unknowns. The final grade is based on the consensus of 2 examiners who have assessed the student's performance.

Final examination: This examination is held in the late spring of a student's final year, and consists of 2 parts. The first part of the examination is done orally, and consists of 12 image sets of disease unknowns. The second part of the examination consists of a written (essay-type) examination. The final grade is based on the consensus of 2 examiners who have assessed the student's performance.

Oral & Maxillofacial Surgery

Curriculum and Program Delivery

The objective of the program in Oral & Maxillofacial Surgery (OMS) is to train individuals in OMS to be competent surgeons and clinical scientists. There is the expectation that graduates would not only become proficient in the surgical techniques of OMS, but also the biological principles of physiology, pharmacology, medicine, anatomy, pathology, surgery and other basic sciences that support and are necessary for individuals to become good diagnosticians and deliverers of evidence-based health care. Graduates are expected to be capable of evaluating the literature, be discriminatively discerning of it, define the limitations of the state of knowledge and perhaps, even on an individual clinical basis to seek answers to fill these voids. Residents are expected to prospectively or retrospectively assess their own treatment results in a truly scientific manner.

The program in OMS is a minimum of four years (48 months) in length requiring the satisfactory completion of didactic and clinical requirements, as well as those of the M.Sc. degree.
The clinical portion of the OMS program is divided into three components over the four-year duration:

1. The first component is 12 months in length and provides the resident with an understanding of the basic surgical principles of OMS.
2. The second 12-month period is spent off service in medically-surgically related disciplines. It is designed to provide the OMS resident the basic medical & related surgical knowledge required to allow for comprehensive perioperative and postoperative patient care. As well, a major component of anaesthesia training is undertaken.
3. The final 24 months of the program places OMS residents in positions of increasing responsibility with respect to their training. This includes a minimum of 12 months of experience including clinical and administrative responsibility. Dedicated time is created during this period to allow for the completion of the research component of their training. During this time, opportunity also exists for off service sub-specialty experience.

The program's requirements are summarized below, and in Appendix 11.

Oral & Maxillofacial Surgery Program Structure

Year 1	Year 2	Year 3	Year 4
First Term Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Oral Surgical Pathology (DEN1013Y) Oral Physiology: Sensory & Neuromuscular Function (DEN1060F) *Second Term* Oral Pathology (DEN1002S) *First and Second Terms* Surgical Orthodontics (DEN2005Y) Craniofacial Anomalies (DEN2007Y) OMFS 1 - The Physiological Basis of Disease (DEN3001Y) OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y) OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y) OMFS 4 - Applied Surgical Anatomy of the Head and Neck (DEN3004Y) - audit Anatomy (DEN3005H) Clinical Conference (PDE9094Y) Research (RST9999Y)	*First and Second Terms* Oral Surgical Pathology (DEN1013Y) Introduction to Biostatistics (DEN1015H) OMFS 1 - The Physiological Basis of Disease (DEN3001Y) OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y) OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y) Research (RST9999Y) CLINICAL ROTATIONS: Anaesthesia: 3 months (Adult), 1 month (Pediatric); Internal Medicine: 2 months; Emergency Medicine: 1 month; General Surgery: 2 months; Otolaryngology: 2 months; SICU: 1 month	*First and Second Terms* Oral Surgical Pathology (DEN1013Y) Surgical Orthodontics (DEN2005Y) OMFS 1 - The Physiological Basis of Disease (DEN3001Y) OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y) OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y) OMFS 4 - Applied Surgical Anatomy of the Head and Neck (DEN3004Y) Clinical Conferences (PDE9094Y) Research (RST9999Y)	*First and Second Terms* Oral Surgical Pathology (DEN1013Y) Surgical Orthodontics (DEN2005Y) [audit] OMFS 1 - The Physiological Basis of Disease (DEN3001Y) OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y) OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y) Clinical Conferences (PDE9094Y) Research (RST9999Y)

ACLS training is to be completed prior to commencement of Year III and ATLS training must be completed before the end of Year IV. Clinical activities are based primarily at Mt. Sinai Hospital, the Hospital for Sick Children, Sunnybrook Health Sciences Centre and other affiliated University of Toronto teaching hospitals, with additional participation at Holland Bloorview Kids Rehab, Lakeview Health, Rouge Valley Health Network, Humber River Regional Hospital and the Faculty of Dentistry. OMS residents participate in all areas of Oral and Maxillofacial Surgery with increasing responsibilities for patient care in their senior years.

In Year IV, electives may be arranged (to a maximum of two months) in craniofacial surgery, head and neck surgery, reconstructive surgery, cleft lip and palate surgery, cosmetic surgery and maxillofacial trauma. More recently, as part of the Toronto-Addis Ababa Academic Collaboration (TAAAC), our OMS program collaborated on drafting the first OMS graduate program at the Addis Ababa University in Ethiopia. This collaboration will provide elective opportunities for our OMS residents to learn about global health challenges and education in developing countries.

In addition to the requisite didactic and clinical training described above, the OMS graduate program also has weekly service meetings, monthly journal clubs, monthly grand rounds, monthly morbidity/mortality and quality assurance rounds and an annual seminar series on the Business of Dentistry to meet the needs of our graduating students. The objectives of the MSc research component are achieved through an original study in clinical, epidemiological, education or laboratory research. The OMS Program Director, a PhD surgeon-scientist with appointments at the Mount Sinai Lunenfeld-Tanenbaum Research Institute and Princess Margaret Clinical Cancer Research Unit, is the Director of the Translational Maxillofacial Pain Research Laboratory at the University of Toronto. His research (supported by CIHR, NIH and industry grants) addresses the many challenges he faces in the clinical management of patients, and provides many research opportunities for OMS residents. In addition, there are endless research opportunities for OMS residents to work with other OMS Faculty (4 PhD, 4 MSc, 1 MEd). Academic OMS Faculty are expert leaders in the field and have assumed leadership roles in local, national and international OMS organizations/ scientific boards as well as provided invited presentations/lectures/papers at international meetings. They have provided continuing education programs in OMS-related subjects and received numerous honours and awards.

OMS residents are encouraged to choose an MSc project according to their personal interest with an OMS faculty or anyone of the world renowned extra-disciplinary faculty members at the University of Toronto. The research must be presented at a research seminar and/or research poster, published in a comprehensive thesis, and supported by an oral defense. In addition to the requisite Faculty of Dentistry course and seminar requirements, the OMS discipline hosts a monthly research skills seminar series throughout the academic year to motivate, support and enhance research skill development for our students. M.Sc. students who are demonstrating excellent progress in all facets of the OMS program, may apply to transfer from the M.Sc. to the Ph.D. degree, should they wish.

A Ph.D. with OMS training, with a minimum program length of 7 years, is offered for exceptional dental graduates seeking advanced training in OMS as well as training in research at the Ph.D. level. The purpose of this program is to train surgeon-scientists who aspire to teaching and research careers in health sciences. We have graduated one individual from this program who has gone on to be a successful surgeon-scientist and program director in OMS at an academic institution, and we currently have 1 PhD candidate registered in the program. Throughout the minimum four years of the program in OMS, emphasis is placed on the development of critical thinking and problem-based learning and the combined academic, research and clinical experience is utilized to achieve

these ends. Residents are also encouraged and financially supported to attend at least one educational course or scientific meeting a year. Upon completion of all program requirements that meet CDAC accreditation guidelines, students are eligible for certification as specialists in OMS. We encourage graduates to seek further education via fellowship programs and/or to pursue academic careers.

Assessment of Learning

OMS residents are regularly evaluated during seminar participation, essays, term tests and examinations in their didactic coursework.

Clinical training and progress is evaluated with regular In-Training Evaluation Reports (ITER) completed by all OMS clinical faculty semi-annually throughout the four years of training, and by all off-service rotation (Anaesthesia, Internal Medicine, Emergency Medicine, General Surgery, Otolaryngology, SICU) faculty following completion of the resident's assigned rotation. ITERs are reviewed with the individual resident in detail by each faculty member and corrective feedback provided.

OMS residents are required to present their MSc work at a research seminar and in the form of a research poster during our annual research day prior to their work being published in a comprehensive thesis, and supported by an oral defence. Most residents are also invited to present their work at a major National or International Scientific meetings (often winning major research awards) and publish a paper in an international peer-reviewed scientific journal.

In order to prepare our OMS residents for the Royal College of Dentists of Canada (RCDC) National Dental Specialty examination, we host semi-annual mock written and oral examinations in OMS at the Faculty of Dentistry. With the recent conversion to a computer-based exam by the RCDC, we have worked with the Faculty IT department to design a similar mock computer-based exam for our residents. OMS residents also participate in the annual Oral and Maxillofacial Surgery In-Training Examination (OMSITE). OMSITE is a 250-question computer-based examination designed to measure the competencies of residents in the field of OMS. It is administered to residents in accredited OMS training programs in North America. The OMSITE covers 10 subject areas designed to reflect the knowledge and skill of participating residents, and assists Program Directors in effectively preparing residents for the RCDC Fellowship/Board Certification Process. Our residents in their final year regularly score in the top 95-99 percentile on the OMSITE exam and all have successfully challenged the NDSE examination.

Orthodontics and Dentofacial Orthopedics

Curriculum and Program Delivery

The mission of the graduate program in Orthodontics and Dentofacial Orthopedics is to train and graduate orthodontists who have the scientific training and clinical skills to make evidence based treatment decisions and to provide excellent clinical orthodontic care, together with a research experience that ensures the ability to critically evaluate the literature with the desire to be life-long learners.

The overall objective is to provide an orthodontic education that meets or exceeds the accreditation requirements for Orthodontics and Dentofacial Orthopedic programs as specified by the Commission on Dental Accreditation of Canada. The program's specific objectives are to provide:

1. a strong educational background in science and investigatory methodology so that decisions in clinical care are evidence based and patient centered.
2. research and teaching experiences that are formulated on the principles and procedures that have biologic and scientific validity.
3. the evaluation and information retrieval skills that are used to critically evaluate the scientific literature and emphasize the principles of an orthodontic career of life-long learning.
4. high quality training in clinical orthodontic technique and mechanotherapy and to develop the clinical skills that will produce a competent clinician.
5. the opportunity to interact with other dental care specialties to provide comprehensive care for those patients requiring a team approach to their overall care.

The maximum number of new students admitted into the program each year is four and at any given period, there is a total of twelve graduate orthodontic students and one DSATP student. Over the past five years the orthodontic graduate program has graduated one combined PhD with specialty training student as well as nineteen students through the MSc with specialty training program in orthodontics. The orthodontic graduate program continues to successfully conduct the DSAT program with five students having graduated from it during the five year period.

The content of the graduate program in orthodontics is derived from both, its scholarly content as well as the clinical training experience. The scholarly content is based on a strong and exhaustive curriculum encompassing basic and applied science as related to the field, lectures and seminars and an original thesis research completed under the supervision of qualified and experienced research mentors. The clinical component is derived from a wide based clinical experience that covers the spectrum of orthodontic problems in growing children and adults. A multitude of clinical techniques are used and the graduate student's clinical training is overseen directly by more than twenty clinical instructors who are very experienced in the respective clinical techniques they teach, with overall direction by the program director. Students also participate in supervised

multidisciplinary treatment by collaborating with graduate students from other disciplines of dentistry such as oral and maxillofacial surgery for the surgical orthodontic cases, periodontics and prosthodontics. In addition, orthodontic graduate students have rotations in Mount Sinai hospital and the craniofacial program at the Hospital for Sick Children, through which they receive a strong educational experience in pain, temporomandibular joint disorders and craniofacial anomalies respectively. In recent years, several technological updates have been made to make the program and clinic paperless and optimally use contemporary technological advancements in the program.
The program's requirements are summarized in the Table below, and Appendix 11.

Orthodontics and Dentofacial Orthopedics Program Structure

Year 1	**Year 2**	**Year 3**
First Term Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Biostatistics (DEN 1015H) Oral Physiology: Sensory and Neuromuscular Function (DEN1060F) *Second Term* Clinical Epidemiology and Evidence-Based Care (DEN1014H) Craniofacial Anatomy and Osteology (DEN2008Y) *First and Second Terms* Orthodontics 1 – Advanced Orthodontic Diagnosis and Treatment Planning (DEN2001Y) Surgical Orthodontics (DEN2005Y) Facial Growth and Facial Analysis (DEN2006Y) Tissue Reaction to Orthodontic and Orthopedic Forces (DEN2010H) Clinical Conferences (PDE9094Y) Research (RST9999Y)	*First Term* Introduction to Biostatistics (DEN1015H) *Second Term* Occlusion: Function and Dysfunction (DEN1016S)* Temporomandibular Disorders (DEN1017S)* *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Orthodontics 2 – Biomechanics, Orthodontic Technique and Practice Administration (DEN2002Y) Surgical Orthodontics (DEN2005Y) Craniofacial Anomalies (DEN2007Y)* Classic Theories of Craniofacial Growth (DEN2009H) Craniofacial Morphology and Development (DEN2011Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) *Offered in alternating years.	*Second Term* Occlusion: Function and Dysfunction (DEN1016S)* Temporormandibular Disorders (DEN1017S)* *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Orthodontics 3 – Ortho Tech & Clin Prac (DEN2003Y) Orthodontics 4 – Interceptive Ortho (DEN2004Y) Surgical Orthodontics (DEN2005Y) Craniofacial Anomalies (DEN2007Y)* Clinical Conferences (PDE9094Y) Research (RST9999Y) *Offered in alternating years.

The program's appointed faculty includes 3 full time (tenured or tenure stream), three half time and three faculty members having 0.25 or 0.20 FTE appointments (all non-tenure stream). Many of these faculty appointed academic staff are also active in research and publications, and have membership with the school of graduate studies. They are accessible to the graduate students of the Faculty for supervision of their original thesis research. Orthodontic faculty members continue to contribute to the scholarly peer reviewed literature (there were more than 15 peer reviewed papers and 3 book chapters in the last

year alone) and have received awards and competitive funding from the American Association of Orthodontists Foundation and other grant agencies. Graduate students have also continued to receive research awards and their clinical and research work has been regularly presented and appreciate at major orthodontic and research conventions.

The Burlington Growth Centre at the University of Toronto is a unique research and teaching tool widely used by scientists and clinicians locally and worldwide. This longitudinal collection of annualized growth records of more than 1200 children is recognized as one of the world's highly respected facial growth studies, and contributes to graduate orthodontic education and research. It has supported in excess of 350 research publications from researchers from Canada as well as internationally. There are, in total, approximately 8,000 sets of records with almost 47,000 radiographs. The radiographic and image files as well as dental models have been scanned digitally and archived using funding support from the orthodontic alumni of the graduate program and a Legacy Collections Grant from the American Association of Orthodontists Foundation, which was successfully funded during the past five years. These initiatives have ensured that this valuable resource can be preserved and made available digitally for further investigation by researchers looking at growth and development and the treatment effects produced by orthodontic, orthopedic and surgical interventions.
The program, with thirteen students, a large cohort of patients, and tenure and non-tenure stream faculty members, suffers from a shortage of space, which is a difficulty encountered throughout the Faculty due to space constraints imposed by the current building. There is a need to increase research funding support for graduate orthodontic students' projects in order to encourage students to conduct original research under supervision. Although clinic performance is efficient, delegation of greater resources and manpower can further enhance clinic performance and further enrich the graduate students' clinical education. The program is looking forward to add latest technological advancements to its repertoire in order to continue to meet and exceed contemporary international standards in clinical education, patient care and research, for which greater funding support will be necessary.

Assessment of Learning

Graduate students are assessed throughout their period of study in the 3 years of their enrollment in the program. The course coordinators of the courses they attend and participate in submit an assessment of each student at the completion of their respective course components, with the oversight of the specialty program director, which is communicated to the graduate studies department on a yearly basis. Clinical performance and achievement of skill levels is done through a yearly assessment made by clinical instructors for every student, and these assessments are provided to the specialty program director. The students' clinical, research and didactic requirements are similarly assessed in the final year of their study. Clinical requirements are deemed complete when the cases assigned to the students are satisfactorily treated and completion or stage records are returned to the clinic coordinator, following which students receive an overall clinical grade. Research requirements are assessed by the satisfactory completion and defense of their M.Sc. thesis, which is examined by a thesis examination committee. Didactic

requirements are assessed by satisfactory completion of all courses the students attend. Each year, the students of the graduating class, who wish to practice as orthodontists in Canada, challenge the National Dental Specialty Examination administered by the Royal College of Dentists of Canada, and the fact that all students have passed this examination clearly demonstrates the attainment of the program's learning objectives.

Pediatric Dentistry

Curriculum and Program Delivery

The graduate program in pediatric dentistry at the University of Toronto has the primary mission to train dentists who specialize in providing primary and comprehensive preventive and therapeutic oral health care for infants and children through adolescence, including those with special health care needs. The program also provides much needed dental health care to unique population groups through graduate student rotations to City of Toronto Public Health Clinic and the Weeneebayko General Hospital in Moose Factory on James Bay.

The Pediatric Dentistry Graduate Program is a 36-month, accredited program leading to specialty certification and an M.Sc. degree awarded by the School of Graduate Studies. The program meets all the educational requirements mandated by the Commission on Dental Accreditation of Canada, and the Council for Dental Education of the American Dental Association. Established in 1960, it is one of the oldest specialty programs in pediatric dentistry. The program accepts up to 4 new students into the first year class. Based upon clinic availability, the program also accepts one student each year for its Dental Specialty Assessment and Training (DSATP) Program.

The program provides didactic education and clinical training pertaining to all aspects of pediatric dentistry with a focus upon prevention and management of dental caries in children. Upon completion of training, graduates are eligible to apply for licensure in the specialty of pediatric dentistry. The clinical program is primarily based at two locations; the University of Toronto, Faculty of Dentistry and The Hospital for Sick Children, Department of Dentistry. At the Faculty, students provide chairside treatment and management in the Children's Clinic, as well as provide comprehensive dental rehabilitation for patients under general anaesthesia in the Pediatric Surgicentre in collaboration with the Department of Anaesthesia. At the Hospital for Sick Children graduate students expand their skills chairside and in the OR setting treating medically compromised and special needs children. Between these two centers our students are exposed to the full scope of pediatric dentistry gaining from the wide breadth of knowledge provided by staff instructors dedicated to development of future pediatric dental specialists. The program is further enriched by rotations to City of Toronto Public health clinic, Mount Sinai Hospital, Holland Bloorview Kids Rehab Hospital and Weeneebayko Hospital in Moose Factory, Ontario.

Didactic curriculum is comprised of core graduate courses offered by the Faculty of Dentistry in the areas of Biostatistics and Clinical Epidemiology, Oral & Maxillofacial Radiology, Oral & Maxillofacial Pathology and Oral Medicine, Craniofacial anomalies, Cleft lip and Palate, and Seminars in Oral Health Sciences. The first year of the program is weighted heavily with didactic courses in order to have graduate students put into practice newly developed skills and knowledge in the following more clinically orientated years. Specialty courses pertaining to all

aspects of pediatric dentistry are provided by Pediatric Dentistry Faculty and span all 3 years.

The program's requirements are summarized below, and in Appendix 11.

Pediatric Dentistry Program Structure

Year 1	Year 2	Year 3
First Term Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Biostatistics (DEN 1015H) Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H) Craniofacial Anomalies* (DEN2007Y) Sedation and Anaesthesia in Pediatric Dentistry (DEN4011Y) *Second Term* Oral Pathology (DEN1002S) Clinical Epidemiology and Evidence-Based Care (DEN1014H) Pharmacology of Dental Therapeutics (DEN1062H) [Audit] *First and Second Terms* Pediatrics (DEN4009Y) Pediatric Dentistry 3 – Facial and Dental Growth and Development in Pediatric Dentistry (DEN4003Y) Pediatric Dentistry 4 – Child Behaviour Management (DEN4004Y) Pediatric Dentistry 6 – Oral and Maxillofacial Surgery as it Applies to Pediatric Dentistry (DEN4006Y) Pediatric Dentistry 7 – Pulp Therapy and Trauma (DEN4007H) Pediatric Dentistry 8 – Conscious Sedation and Anaesthesia in Pediatric Dentistry (DEN4011Y) Pediatric Dentistry 9 – Care of Patients with Special Needs and	*First Term* Pediatric Orthodontics (DEN4008Y) Clinical Conferences (PDE9094Y) *First, Second and Third Terms* Pediatric Dentistry 1 – Theory (DEN4001Y) Pediatric Dentistry 2 – Journal Review (DEN4002Y) Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y) Research (RST9999Y)	*First, Second and Third Term* Seminars in Oral Health Sciences (DEN1001Y) Pediatric Dentistry 1 – Theory (DEN4001Y) Pediatric Dentistry 2 – Journal Review (DEN4002Y) Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y) Pediatric Orthodontics (DEN4008Y) Research (RST9999Y)

Applied Pediatric Dentistry (DEN4010Y) Pediatric Orthodontics (DEN4008Y) Clinical Conferences (PDE9094Y) *First, Second and Third Terms* Pediatric Dentistry 1 – Theory (DEN4001Y) Pediatric Dentistry 2 – Journal Review (DEN4002Y) Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y) Research (RST9999Y) *Offered in alternating years.		

Graduate students are expected to be able to diagnose and develop a management strategy for children, adolescents, and individuals with special health care needs. The curriculum specifically addresses the following competency fields pertaining to pediatric dentistry:

1. Foundational sciences
2. Comprehensive patient history and liaison with other dental and medical professionals
3. Oral diagnosis and treatment planning
4. Radiography with emphasis on application in pediatric population
5. Pharmacological and non-pharmacological child behavior management.
6. Caries prevention and risk assessment
7. Oral/Facial growth and development and Orthodontics
8. Dental trauma and Emergency care
9. Hospital dentistry – indications, management, protocols and procedures
10. Patients with special needs – access to care, special protocols
11. Research and Literature Review skills
12. Professional development, Ethics, Advocacy and Leadership

Graduate students are required to undertake a research project which they must defend for their MSc degree. During the 36 month duration of the program, students are provided with 14 non-consecutive months of protected time for independent study/research.

Students have access to a wide variety of research areas at the University of Toronto including clinical, basic science and interdisciplinary pursuits. They are encouraged to choose a field of interest and initiate their project early in first year. Program Faculty have in recent years collaborated on graduate student research projects with investigators in the Center for Addiction and Mental Health and with the Department of Nutritional Sciences.

An External Review was undertaken in February 2016, in anticipation of the retirement of the Program director and appointment of a new director. Several recommendations arose from this review including curriculum review and restructuring of some aspects of the program. The timeline for individual items within the curriculum also needs to be reviewed given recent changes in the National Specialty Dental Examination dates by the Royal College of Dentists of Canada from two examination rounds (Fall and Spring) to a single examination round in Spring of each year. Determination of these changes and their execution are going to be particularly challenging given the multiple sites for program delivery. Overall the core curriculum remains strong but will benefit from a collaborated effort amongst all faculty to review courses and teaching methods to ensure maximum educational benefit for students.

Program research needs to be strengthened for leadership within the specialty of pediatric dentistry. The program needs to make a concerted effort for extramural and interdisciplinary collaborations with others in the Faculty of Dentistry, in the University of Toronto at large, and with national and international peers.

Some changes of individuals in program faculty have also taken place to facilitate new directions in curriculum development and delivery. These transitional changes will have positive impact on program sustainability and growth in the long term. The department is working on increasing communications both with individual graduate students and class cohorts to ensure a high level of training and graduate school experience. The expectation remains that the program transition will be completed within two years and prior to the next accreditation site visit.

Assessment of Learning

Student performance is assessed in an ongoing manner for each program year in the clinical, didactic and research streams. Clinical assessment consists of daily informal chairside evaluation and feedback by instructors. Interactive discussions with students about their clinical cases are encouraged. Didactic evaluations include seminar performance, assignments, case presentations and reviews as well as more formal examinations carried out by both staff from the Faculty of Dentistry and the Hospital for Sick Children. Completion of Research projects are achieved by progression through committee meetings, evaluation of written thesis and final oral defense.

Achievement of program objectives and expectations is measured using two specific outcome criteria: First, for the clinical component, student success in the National Dental Specialty Examination in Pediatric Dentistry offered by the Royal College of Dentists of Canada. Second, for the research component, successful defense of the M.Sc. thesis research project.

Periodontics

Curriculum and Program Delivery

The primary goals and objectives of the program are to educate and prepare graduate students for a career in clinical and/or academic periodontics. Our goal is to put equal emphasis on the achievement of the highest standards possible in the clinical and didactic training of graduate students and on their pursuit of excellence in research that is required for completion of a M.Sc. or PhD.

Over the past 5 years, the pool of applicants has remained strong such that the program has consistently filled all positions with applicants where the University of Toronto was their first choice. The level of research has also remained strong within the last 5 years. Since 2011, we have graduated 19 M.Sc. and 3 Ph.D. students.

The program allocates dedicated time for research so that the residents can completed their thesis in a timely manner. First year is mainly focused on research while the second and third year of the MSc is dedicated to clinical training and rotations. As a result, since 2011, 95% of the residents have completed both their research and clinical requirements in a timely manner.

The amount and depth of clinical training is extremely robust. The residents have significant exposure to periodontitis cases. Each residents treat over 150 cases of periodontitis that requires a wide range of nonsurgical and surgical treatments and over 30 periodontal plastic cases. Upon graduation, the residents are competent in single-drug intra-venous sedation by successful completion of over 20 cases. Clinical experience in implant dentistry is particularly strong in the Oral Reconstruction Unit. They treat over 100 cases that require implant surgery, ridge augmentation, sinus lift and restoration of implants. The prosthetic aspect has significantly strengthen over the last five years with increased involvement with prosthodontists. The clinical experience in the Implant Prosthodontic Unit (IPU) has also improved due to new leadership and restructuring of the referral pattern. In the IPU, there is an interdisciplinary collaboration between the periodontic and prosthodontic graduate students. Periodontal resident have significant experience in the hospital setting where they are exposed to oral pathosis at Mt. Sinai Hospital and cancer-related pathosis at Princess Margaret Hospital. They also gain clinical experience in management of patients with temporomandibular disease-related pain through the Mt. Sinai Hospital. Advance research is being performed in the refractory and peri-implantitis clinics. The senior residents rotate through these clinic and gain experience in management of refractory and peri-implantitis cases.

Currently, the graduate program has a high number of periodontal residents. The clinical facilities available for graduate periodontics are inadequate to allow maximal clinical exposure for the residents. The present facilities are fully utilized, giving the students adequate clinic time but this could be markedly improved with additional space. Similarly, the graduate clinic could function more effectively with additional support staff. There is an increasing challenge in finding suitable PI's to be MSc supervisors for the residents.

Currently, the number of faculty members are adequate but a number of them will be reaching retirement age. In a few years, we need plan for their eventual retirement. Recruitment of academics who are periodontists and capability of doing high-level research will be a challenge.

The program's requirements are summarized below, and in Appendix 11.

Periodontics Program Structure

Year 1	Year 2	Year 3
Second Term Clinical Epidemiology and Evidence-Based Care (DEN1014H) *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Research Ethics (DEN1010H) Introduction to Biostatistics (DEN1015H) Periodontology – Seminars and Clinics I (DEN1033Y) Literature Review in Periodontology (DEN1036Y) Principles and Practice of Periodontology (DEN1039Y) Biology of Connective Tissues* (DEN1080Y) Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H) Research (RST9999Y) *Offered in alternating years.	*First Term* Oral Radiology (DEN1007F) *Second Term* Oral Pathology (DEN1002S) *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Investigating Pathogenic Biofilms (DEN1022F) Periodontology – Seminars and Clinics II (DEN1034Y) Literature Review in Periodontology (DEN1036Y) Clinical Case Presentations (DEN1037Y) Biomaterials and Implant/Reconstructive Dentistry (DEN1038Y) Principles and Practice of Periodontology (DEN1039Y) Biology of Connective Tissues* (DEN1080Y) Parenteral Moderate Sedation for Dental Procedures (DEN1091Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) *Offered in alternating years.	*First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y) Oral Surgical Pathology (DEN1013Y) Periodontology - Seminars and Clinics III (DEN1035Y) Clinical Case Presentations (DEN1037Y) Biomaterials and Implant/Reconstructive Dentistry (DEN1038Y) Principles and Practice of Periodontology (DEN1039Y) Parenteral Moderate Sedation for Dental Procedures (DEN1091Y) Clinical Conferences (PDE9094Y) Mount Sinai Rotations Princess Margaret Hospital Rotations Implant Prosthodontics Unit (IPU) Oral Pathology Rotation (Clinical and Microscopic) Research (RST9999Y) Elective Graduate Courses Other courses may be arranged

Assessment of Learning

The residents are required to maintain a procedural logbook that documents their clinical experience. The logbook documents the resident's breadth of clinical experience. In addition, the residents undergo formative portfolio assessment (FPA). FPAs are repetitive cycles of self-assessment and reflection that are reviewed between the resident and program director. The residents also receive In-training Evaluation Reports (ITERs) that rate their clinical performance in knowledge, skills, therapy and professionalism. ITERs are a summary of the instructors' evaluations and are reviewed with the residents two times per year. The third year resident at the end of the program will receive a summative final evaluation report (FITERs). The residents also undergo five formative examination where

clinical cases are used to evaluate them on diagnostic and therapeutic skills while the third year residents receive a summative examination on clinical cases. Achievement of clinical competency is determined by the procedural logbook, FPAs, FITERs and successful passing of the summative examination on clinical cases.

Prosthodontics

Curriculum and Program Delivery

The graduate program in Prosthodontics at the University of Toronto is a 36 month program that prepares graduates to become leaders in the specialty of Prosthodontics. It is one of only two such English-language programs in Canada. The program's curriculum integrates didactic, teaching, research, clinical and team-building components. The program leads to an M.Sc. degree, but can also be structured to lead to a Ph.D. degree. The scholarly and patient care activities are undertaken in accordance with the guiding principles of the University of Toronto and the Faculty of Dentistry and their stated commitment to international leadership and excellence in advancement of knowledge and service to the patient community. Successful completion of the program qualifies graduates to sit the National Dental Specialty Examination (NDSE) in Prosthodontics at the Royal College of Dentists of Canada (RCDC).

The specialty program in Prosthodontics integrates excellence in patient care, education and research. To maintain the excellence in all three, the following are essential to the continued success:

1. Attracting, developing, and retaining the best people (residents, clinicians, administrators, educators, and researchers);
2. Demonstrating quality, excellence and continued advancement in service to patients, education, and research;
3. Generating financial strength to support our mission and the mission of the Faculty;
4. Exposing the residents to a diversity of clinical situations and critical concepts that constantly test and expand the limits of the residents' knowledge and critical thinking skills;
5. Creating an educational and working environment that is positive, professional, and productive;
6. Attaining and maintaining solid commitment from the Faculty and the University in support of the Program.

The Prosthodontist is a uniquely trained member of the oral health team to provide an assessment and restoration of form, function, comfort and aesthetics to the dental patient. The Prosthodontist uses a variety of technical, surgical, and psychological approaches to achieve patient-specific goals and coordinates the efforts of other allied dental health professionals. The Prosthodontist is expertly educated to appreciate:

1. the biological and psychological impact of the medical and dental conditions on the person;
2. the value of the patient-doctor relationship;
3. the biologic and technical cost inherent in most interventions;
4. the value of seeking interventions that are reversible, minimally invasive, and financially prudent;

5. the need for prosthodontically-driven treatment planning including prosthodontically-driven implant placement;
6. the value of clinical precision, minimal tissue trauma, and laboratory excellence;
7. the value of long-term follow-up;
8. the core of diverse treatment approaches (including "no treatment") applicable to the management of patients' objective and subjective treatment needs.

Program's goals and objectives are to:

1. prepare highly competent clinicians to practice all facets of Prosthodontics and allied disciplines;
2. prepare future leaders in Prosthodontics who are equally able to lead in clinical practice, academic setting, or organized dentistry;
3. train graduates who will take pride in their education, their program, their university and their specialty and who will work hard to advance the individual and collective goals of these entities;
4. educate residents to achieve competence to:
    a. assess, interpret, and diagnose acquired, developmental, and congenital conditions as well as conditions as a consequence of trauma and variations in the normal form, function, and appearance;
    b. treatment plan diverse fixed, removable and implant-based prostheses and other interventions;
    c. become independent in assessing, diagnosing, and formulating a valid and coherent treatment sequence;
    d. obtain and maintain informed consent;
    e. select and carry out case-specific prosthodontic, surgical, and laboratory procedures in support of the agreed upon treatment plan;
    f. diagnose and manage prosthodontic, medical, and surgical emergencies that may arise as part of prosthodontic care or as part of surgical care undertaken in support of prosthodontic objectives;
    g. apply knowledge gained in the basic sciences, prosthodontic literature, evidence-based dentistry, allied dental specialty fields and ethics to the practice of Prosthodontics;
    h. develop superior communication skills with patients, referring professionals, and professional organizations;
    i. liaise with allied dental health professionals and medical professionals;
    j. know the limits of their knowledge and skills;
    k. constantly seek growth opportunities in their knowledge and skills.

Students must complete at least 20 complex cases to the satisfaction of the Program Director. It is understood that students will actually treat many more patients. All cases serve to advance the students' exposure to the variety of cases and contribute tremendously to the residents' growth and education. The program aims to ensure that the students' clinical training is diverse in terms of scenarios and procedures. Students also participate in supervised multidisciplinary treatment by collaborating with graduate students from other disciplines of dentistry such as Oral and maxillofacial surgery,

Periodontics and Orthodontics. All patient care in the Graduate Prosthodontics program must meet a certain minimal complexity threshold. Case complexity is assessed through a combination of scope of treatment and presence of complicating factors.

In terms of patient care delivery, Graduate Prosthodontic clinic supports private practice practitioners, hospital departments, and other teaching clinics at the University of Toronto (graduate and undergraduate). The Graduate Prosthodontic clinic addresses patients with complex dental care needs and sometimes functions as a clinic of last resort. The presence of the Graduate Prosthodontics program and clinic at the Faculty, enables other clinics to treat more advanced clinical situations through collaborative and multidisciplinary care provision.

The program prepares graduates equally well for a career in private practice and in academia. Graduates of the program have gone on to occupy a variety of leadership positions in academia both nationally and internationally. At least 10 of the program's graduates have gone on to lead a department, a hospital-based program, a graduate program, or a major administrative subdivision within an academic setting. The program can be integrated with a PhD, and 10 of our graduates have followed this path (most recently in 2013). Two of our graduates have gone on to obtain additional degrees or fellowships in the last 5 years: one has obtained specialty status in Periodontics, and one has obtained fellowship in Maxillofacial Prosthodontics.

The program's requirements are summarized below, and the Appendix 11.

Prosthodontics Program Structure

Year 1	**Year 2**	**Year 3**
First Term Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Biostatistics (DEN 1015H) Oral Physiology: Sensory and Neuromuscular Function (DEN1060F) *Second Term* Clinical Epidemiology and Evidence-Based Care (DEN1014H) *First and Second Terms* Prosthodontics I - Prosthodontic Treatment Planning (DEN1041Y) Prosthodontics II - Restorative Dentistry* (DEN1042Y) Prosthodontics III - Patients with the Partially Edentulous Mouth and Advanced Prosthodontic Care (DEN1043Y)	*First and Second Terms* Occlusion: Function and Dysfunction (DEN1016S)* Temporomandibular Disorders (DEN1017S)* Prosthodontics I (DEN1041Y), III (DEN1043Y), IV (DEN1044Y) Clinical Prosthodontics (DEN1046Y) Advances in Dental Materials (DEN1070S)* Research (RST9999Y) Elective Graduate Courses *Offered in alternating years.	*Second Term* Occlusion: Function and Dysfunction (DEN1016S)* Temporormandibular Disorders (DEN1017S)* *First and Second Terms* Seminars in Oral Health Sciences (DEN1001Y) Prosthodontics IV (DEN1044Y) Clinical Prosthodontics (DEN1046Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) Elective Graduate Courses *Offered in alternating years.

Prosthodontics IV - Patients with the Fully Edentulous Mouth and Advanced Prosthodontic Care (DEN1044Y) Prosthodontics V - Introduction to Critical Appraisal of the Literature (DEN1045Y) Clinical Prosthodontics (DEN1046Y) Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H) Research (RST9999Y)		

Students' learning occurs through formal courses, clinical patient care, rotations, poster presentations, written journal submissions, Master's research project, self-directed learning, teaching opportunities and guest presentations by national and international leaders in the field. Clinical patient care, clinical rotations and research projects constitute a substantial learning opportunity beyond the classroom setting. Students' rotations include surgical implant placement and associated surgical procedures in the Implant Prosthodontic Unit, treatment of paediatric patients with prosthodontic needs at the Bloorview McMillan center, care of prosthodontic patients with maxillofacial needs at the Princess Margaret Hospital, and care of prosthodontic patients with significant medical compromises at the Mount Sinai Hospital. Clinical care is delivered under the guidance of experienced clinical instructors representing a breadth of educational backgrounds and private practice foci and interests. The involvement of private practice practitioners in the didactic and clinical aspects of the program allows the program to remain fresh, current, and relevant. Curriculum is revisited and adjusted yearly to reflect clinical evolution of the field and research developments.

Research undertaken in the program and the program's curriculum reflect what is state-of-the-art in the specialty and practice of Prosthodontics. Primary areas of research interests are pain (Dao, Avivi-Arber), biomaterials (Finer, Shokati), maxillofacial (Somoygi-Ganss), Sjogren's (Laing), and implant failure (Chvartszaid).

The Implant Prosthodontic Unit (IPU) is an internationally recognized treatment unit and research center focusing on implant-based prosthodontic treatment. Treatment outcome and patient data is being prospectively gathered on patients treated with implants in the Graduate Prosthodontic clinic. The interdisciplinary makeup of this unit was the first of its kind in the world, and the duration of patient follow-up is second in the world only to the original Branemark research in Gothenburg, Sweden. Dozens of publications have arisen from the patient data on file in IPU. IPU continues to be an important research center for prosthodontic research and scholarship activity.

Assessment of Learning

Assessment of students is undertaken through assessment of their performance along the clinical, didactic, and research streams. Clinical performance is assessed through daily informal chairside evaluations and feedback (formative assessment), weekly one-on-one sessions, formal twice-yearly written feedback from the clinical demonstrators (summative assessment) and twice-yearly in depth patient family review. Didactic performance is assessed through presentations, written submissions, poster presentations, tests, exams and weekly one-on-one sessions. Research performance is assessed through committee meetings, written thesis and oral defence. In passing courses, successfully defending their theses, and passing the NDSE that students demonstrate achievement of the program learning objectives and the program's Degree Level Expectations.

4. RESEARCH

Scope, Quality and Relevance

The Faculty of Dentistry has a long-standing history of housing the most comprehensive research program of all Canadian dental schools. The Faculty fosters basic science and clinical research in both wet and dry laboratories. The particular strengths and areas of future growth of the Faculty's research activities include, but are not limited to, the following areas:

1. Biomaterials
2. Growth, Development and Regeneration
3. Pain and neurosciences
4. Microbiology
5. Dental Public Health
6. Oral Pathology
7. Education Research

Research by clinical faculty is conducted in several disciplines and although the scholarly output from this clinically-oriented research is high, securing funding from competitive sources remains a challenge.

Faculty of Dentistry researchers produce between 150 to 200 PubMed-indexed publications per year.

Table 4.1: Number of Publications Indexed in Scopus

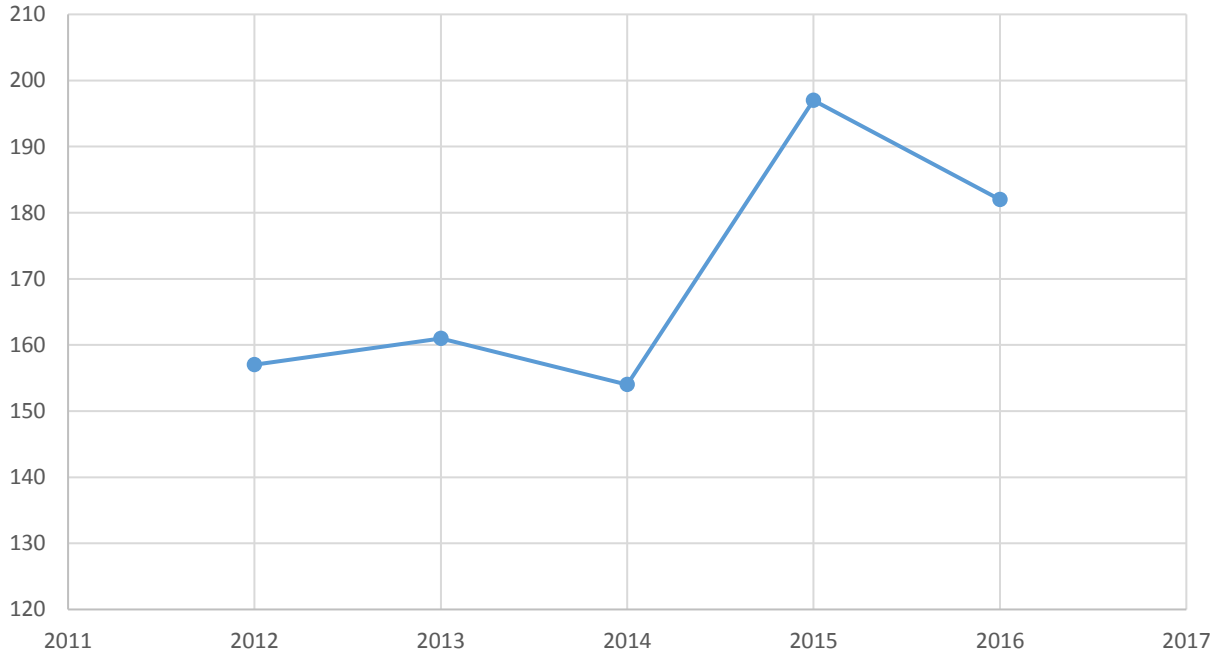


Table 4.1 above indicates that productivity has increased in 2015 compared to previous years and the incomplete data for 2016 confirm this trend. The majority of publications appear in journals focusing on biomaterials, mineralized tissue and endodontics.

The quality of the scholarly activity among our researchers varies widely as measured by performance indicators (scholarly output, number of citations, journal impact factor, H index). Twenty-five faculty members have held competitive research funds over the past 5 years. Some faculty members without competitive research funds have published extensively regardless. It is therefore impossible to provide objective quality metrics without extensive individual details. With the details provided it is fair to state that our Faculty has the best and most extensive research program in Canada, and ranks among the leading schools of dentistry in North America.

The relevance of research in all individual areas is directly related to advancement of scientific knowledge, improvement of clinical procedures and commercialization opportunities.

The following report focuses mostly on faculty with an active research program, defined as holding competitive, peer-reviewed research funds as nominated principal investigator, and an active publication record over the past five years.

In line with the 2014-2019 Strategic Plan of the Faculty, efforts to identify a limited number of research foci of particular strength (previously biomaterials; growth, development and regeneration; pain and neurosciences, microbiology, dental public health, education research) have led to the realization that definition and maintenance of individual foci is impractical due to the growing overlap between them. Such definition of foci also cannot capture the vast breadth of research being conducted while limiting collaborations and the freedom to hire new faculty members with innovative research interests. Nevertheless, for the purpose of this report, faculty members are listed under previous research themes wherever possible. Others are listed under a separate category.

Biomaterials

This theme focuses on the development of novel biomaterials for applications in and outside of the oral cavity, and aims to improve longevity of existing materials.

Dr. Paul Santerre obtained his PhD in 1990 in the area of biomaterials design for blood contacting systems. Formerly the Associate Dean of Research in the Faculty of Dentistry (2003 to 2008), and Director of the University of Toronto's Institute of Biomaterials and Biomedical Engineering (IBBME; 2008-2013) he has established a very active and well-funded research program focused on investigating the relationship between polymers and bio-degradation processes in the body to advance the design of new materials for tissue engineering, implants and medical devices. In addition to a prolific publication list he holds over 59 patents and is the founder of Interface Biologics Inc., a University of Toronto biotech start-up company developing catheters and drug-polymer coatings for medical devices. He has received numerous prestigious awards for his contributions to the advancement of science.

Dr. Santerre has recently moved his laboratory operations to the newly established Ted Rogers Centre for Heart Research (TRCHR) while maintaining his primary academic appointment at the Faculty of Dentistry. He holds several cross-appointments at academic divisions within the University of Toronto.

Dr. Yoav Finer is a clinician-scientist (DMD 1996; PhD 2000) and currently holds the George Zarb/Nobel Biocare Chair in Prosthodontics at the Faculty. His research focuses on composite resin biodegradation, bacterial role and host-biomaterial interactions, physical and surface characterization of dental polymers, dental biomaterial development, optical methods to detect enamel caries lesions and methods to improve the accuracy of implant supported prostheses. His research has been supported by the Canadian Institutes of Health Research (CIHR), the National Institutes of Health (NIH, USA) and several other sources including the Canada Foundation for Innovation. He holds an academic cross-appointment at IBBME.

Dr. John Davies received dental (BDS) and science degrees (PhD, DSc) in the U.K. His research laboratory is located in the Lassonde Mining Building of IBBME, but he maintains his primary academic appointment at the Faculty of Dentistry. His research interests focus on biomaterials and stem cells in bone regeneration, peri-implant bone healing, novel biomaterial development, bone tissue engineering, sourcing and expanding human mesenchymal cells and cell based therapies for bone and other diseases. He maintains a strong commercialization-oriented research profile. His group has developed OsteoScaf, a novel biodegradable bone regeneration scaffold that was successfully brought to market. He is also the founder of Tissue Regeneration Therapeutics (TRT), based on the patented technology to harvest mesenchymal stem cells from human umbilical cord perivascular (HUCPVC) cells. His prolific research, which has resulted in filing of over 80 patents, is largely supported through industrial grants and partnerships.

Dr. Grace de Souza has received dental and science training (DDS, MSc and PhD) in Brazil and has established an active research program on dental restorative materials with a particular focus on zirconia-based materials. Her studies include the characterization of structural changes on ceramic surfaces to improve adhesion, mechanical properties and resistance to failure.

Dr. Anuradha Prakki also received dental and science training (DDS, MSc and PhD) in Brazil and maintains, in addition to a strong teaching portfolio, an active research program to develop and characterize dental restorative materials with antimicrobial activity. She also studies mechanical, physical and biological properties of dental resin composites and polymers.

Dr. Karina Carneiro was recently hired (July 1, 2016) as Assistant Professor (tenure-stream) after completing science training (PhD in chemistry from McGill University, 2013) and post-doctoral training at UCSF. Her research interests are in the development of novel protein- and peptide-modified DNA scaffolds for biomaterial development, primarily for hard and mineralized tissue regeneration. Her research program aligns well with several investigators at IBBME.

Growth, Development and Regeneration

This theme is the largest and focuses on understanding basic cellular and molecular mechanisms that control the dynamic equilibrium of mineralized and connective tissues in health and disease, which is paramount to the maintenance of oral health. This theme includes a broad range of various topics including biomineralization, mechanobiology, and

immunology. Researchers in this theme are well connected through collaborations and cross appointments with many other faculties and departments at the University and its affiliated hospitals.

Dr. Bernhard Ganss received his PhD in 1993 and his research focuses on the molecular control of mineralized and connective tissue formation and maintenance. His research aims to understand the details of the transcriptional control mechanisms for bone and cartilage formation and the molecular control mechanisms of biomineralization, using dental enamel formation as a model system. Work in his group has led to the discovery of novel enamel-specific proteins that play a role in the etiology of *amelogenesis imperfecta*, and are likely involved in maintaining dentogingival attachment. Mineral-inducing properties these proteins are currently explored for the development of novel hydroxyapatite-based biomaterials. Dr. Ganss holds a cross-appointment at IBBME and his work has been continuously supported mainly by CIHR and NSERC grants

Dr. Michael Glogauer: Research in the Glogauer lab covers both fundamental and clinical studies. As a trained clinician/scientist (DDS, PhD) his overall research program focuses on oral innate immunity, development of non-invasive diagnostic tools and oral health in special need patient populations. The specific projects include work on the role of the signaling molecules Rac1 and Rac2 as well as the cytoskeletal protein filamin A in osteoclast formation and neutrophil functions. Collaborative projects with several teaching hospitals are geared toward understanding neutrophil tissue delivery kinetics and susceptibility to infection. Clinical research in the Glogauer lab focuses on developing non-invasive diagnostic tools to measure susceptibility to infection in patients with innate immune defects and for diagnosing periodontal diseases. This work has resulted in patent submissions in both the United States and Canada and has been continuously supported by a large number of competitive granting agencies.

Dr. Siew-Ging Gong: As a trained orthodontist and clinician/scientist (DDS, PhD), Dr. Gong's research focuses on the overall goal to understand the intricate genetic control mechanisms of craniofacial development, particularly as they relate to developmental disorders such as cleft lip and palate. Specific projects aim at understanding the role of the matrix protein FLRT2 in cell-cell and cell-matrix interactions during craniofacial growth and development, the role of the growth factor receptor FGFR in craniosynostotic syndrome and the cellular, molecular and clinical aspects of orthodontic tooth movement. Work in the Gong lab has been supported by funds from clinical associations and NSERC.

Dr. Boris Hinz: As a fundamental scientist (PhD, 1998) Dr. Hinz' overall research theme is the molecular pathogenesis of fibrotic diseases, specifically the biomechanics and the cell and molecular biology of mesenchymal cells in the context of tissue repair and regeneration. The myofibroblast, a cell phenotype that drives tissue remodelling in wound healing, in fibrosis of all organs, and in the stroma reaction to tumours, plays a central role in these studies. This work extends into areas of bioengineering and biophysics because myofibroblasts are mechano-responsive cells that receive and transmit forces from and to their environment. Moreover, biomaterials used to produce implant scaffolds or synthetic body parts often generate fibrotic reactions by activating myofibroblast differentiation from a variety of precursor cells, including mesenchymal stem cells. The Hinz lab is among the most prolific in terms of scholarly activity and competitive research funding and is

linked with multiple departments and divisions at the University and its affiliated hospitals. Dr. Hinz is the past president of the European Connective Tissue Society and as such maintains a strong international collaborative network. He is also involved in several local and international commercialization activities.

Dr. Morris Manolson: As a basic scientist (PhD, 1989), Manolson leads a research program that aims to understand what controls the equilibrium between formation and resorption in the maintenance of bone, particularly the function of a proton transporter subunit (V-ATPase "a") that is largely responsible for dissolution of bone mineral by osteoclasts. Specific objectives include structure/functional analyses of V-ATPase subunits, their interactions, roles in signal transduction and the mechanisms that lead to their tissue-specific distribution. The ultimate translational goal of this research is to develop V-ATPase inhibitors as potential therapeutics to prevent bone loss in such prevalent diseases as osteoporosis. Research in the Manolson lab has received continuous support through funds from CIHR, the Canadian Arthritis Network and The Arthritis Society.

Dr. Christopher McCulloch: As the most senior investigator in this theme, Dr. McCulloch (DDS, PhD) has developed a long-standing, highly successful research program that addresses fundamental questions of connective tissue matrix remodelling. Some of the most prominent research accomplishments in the McCulloch lab include:

- The demonstration that mechanical forces regulate the differentiation of myofibroblasts by modulating the expression of the cytoskeletal protein alpha smooth muscle actin
- The discovery that actin dynamics is intimately linked with signaling networks that regulate cell behavior in response to inflammatory stimuli.
- The definition of a critical role of fibroblasts in collagen degradation by phagocytosis. This has provided the biological basis by which inflammatory cytokines and aging processes cause dysfunctional collagen homeostasis, leading to the formation of collagen overgrowth and fibrosis.
- The demonstration that the actin cross linking protein filamin A protects cells against force-induced death, introducing the concept of *mechanoprotection* into the scientific literature. Additional molecular details of this protective mechanism continue to be elucidated.

Collectively this research has resulted in over 280 peer-reviewed scientific publications and has had a defining influence on the understanding of cell-matrix dynamics. Dr. McCulloch has held a tier 1 Canada Research Chair (CRC) in Matrix Dynamics since 2006 (renewed in 2013). Funding support for this research has been obtained from a large variety of sources including CIHR, NSERC and the Heart and Stroke Foundation.

Dr. Irina Voronov: As a basic scientist (PhD) Dr. Voronov studies signal transduction pathways in osteoclasts, the bone resorbing cells. Her laboratory is particularly interested in studying the role of lysosomal pH in regulating signal transduction in osteoclasts using an osteopetrotic mouse model with a point mutation in the a3 subunit of the proton pumping V-ATPase. Since osteoclasts are the cells responsible for excessive bone loss this work is relevant to promote the understanding of pathological mechanism and the development of therapeutic interventions for osteoporosis, inflammatory arthritis,

periodontal disease and cancer-related bone lysis. Her work has received funding from CIHR, Sick Kids Hospital and the Arthritis Foundation.

Dental Public Health

Research in this theme is focused on describing and understanding the correlations between socio-economic factors and clinical outcomes in dentistry with the aim to link academic and community research, service providers, consumers and policy makers to understand complex challenges and to maximize the benefit in delivering dental care.

Dr. Amir Azarpazhooh: Dr. Azarpazhooh's research interests focus on patient-centered outcome measurements in dentistry; eliciting patient utility in clinical dentistry; clinical research in dentistry; epidemiology of endodontic disease; application of evidence-based healthcare in teaching and practice; systematic reviews and meta-analyses of the efficacy of clinical interventions. Dr. Azarpazhooh (DDS, PhD) holds a cross-appointment at the UofT Institute of Health Policy, Management and Evaluation (IHPME) and is an investigator at the Toronto Health Economics and Technology Assessment Collaborative. He has authored numerous publications and is Co-Principal Investigator on a recent CIHR-funded study to evaluate the efficacy and safety of xylitol in preventing middle ear infection in children.

Dr. Herenia Lawrence: Research in Dr. Lawrence's group focuses on oral health-related issues and challenges in aboriginal and vulnerable populations. Dr. Lawrence (DDS, PhD) has been the Canadian investigator on a multinational research grant entitled "Reducing disease burden and health inequalities arising from chronic dental disease among Indigenous children: an early childhood caries intervention", funded by a CIHR-supported International Collaborative Indigenous Health Research Partnership (ICIHRP) grant and continues to address challenges in improving mother and child oral health in aboriginal communities.

Dr. Carlos Quiñonez: Dr. Quiñonez (DMD, PhD) is a researcher and dental public health specialist. He is the director of the Specialty Training Program in Dental Public Health at the Faculty of Dentistry His overall research aims to understand which and how socio-economic factors influence access to and quality of dental care. His main focus is on applied policy research, with an emphasis on equity and the history, politics, and economics of dentistry. Dr. Quiñonez' prolific research is supported by funds from CIHR, the Government of Ontario and regional Public Health organizations.

Pain and Neurosciences:

This theme addresses questions of pain perception, processing and modulation on several levels. Investigators in this area apply electrophysiological, imaging, molecular, genetic, sensory and behavioral techniques, among others, in vitro and in vivo, to understand mechanisms of sensory and motor activity, and its control and plasticity.

Dr. Limor Avivi-Arber: Dr. Avivi-Arber is a clinician /scientist (DDS, PhD) whose research is addressing questions of how the brain, and which areas within it, control sensory and motor function, how these activities can be modulated and what controls plasticity and adaptation of these neural circuits. She has begun using rodent models of orofacial pain and

motor function and dysfunction (e.g. nerve injury, tooth loss, dental implants) and employs electrophysiological, histological, immunohistochemical, behavioural, pharmacological and imaging (e.g., optical and magnetic resonance imaging) techniques for their analysis.

Dr. Iacopo Cioffi: Dr. Cioffi is an orthodontist and scientist (PhD 2008) who studies the effect of somatosensory stimuli on orofacial pain. Since joining the Faculty in 2015 he has begun to study the effects of music on the habitual activity of masticatory muscles and on daytime tooth clenching in patients affected with masticatory muscle pain. For this study, which is conducted with collaborators at Mount Sinai Hospital, he has been awarded a research grant from the American Academy of Orofacial Pain.

Dr. David Lam: Research by Dr. Lam (DDS, PhD, MD) addresses the challenges in the clinical management of patients with cancer pain. He and his colleagues developed novel head and neck cancer-specific models in mice, which parallel the temporal progression and functional impairment experienced by humans with cancer. Using combined molecular, pharmacologic, behavioral, and genetic approaches in these models, they have identified a direct role for serine proteases and their protease-activated receptor (PAR2) in the pathogenesis of cancer pain. Dr. Lam is now beginning to investigate how serine protease inhibitors and PAR2 antagonists may be useful for the treatment of cancer pain.

Dr. Massieh Moayedi; Dr. Moayedi has recently (July 1, 2016) been appointed as Assistant Professor (tenure stream) at the Faculty. During his graduate (PhD 2012) and postgraduate training (University College, London, UK) he has employed dynamic imaging techniques of neural networks in orofacial pain perception and management and plans to apply these techniques to further delineate specific areas in the frontal cortex that are involved in processing and controlling pain.

Dr. Ze'ev Seltzer: The central research theme by Dr. Seltzer (DMD) is comparative pain genetics, using human and rodent models of chronic pain, mainly those produced by traumatic and surgical injuries. His studies, previously funded through the Canada Research Chair program (tier 1) and NIH grants, employ behavioural, pharmacological, electrophysiological, brain imaging, immunohistological, transcriptomics, exomics, whole-genome mapping of quantitative trait loci (QTL) and genotyping of single nucleotide polymorphisms to identify candidate pain genes.

Dr. Barry Sessle: Since the 1970s, the research conducted by Dr. Sessle (BDS, PhD) has made fundamental contributions to neuroplasticity of sensorimotor neural networks. Using electrophysiological and related neuroanatomical techniques, his work has clarified neural and non-neural mechanisms underlying the initiation and control of pain, in particular oral-facial pain; and reflex and higher centre control mechanisms of oral-facial motor functions such as chewing and swallowing. Dr. Sessle was Dean of the Faculty of Dentistry from 1990-2001. He is an elected Fellow of the Royal Society of Canada, a member of the Canadian Academy of Science, and a Fellow of the Canadian Academy of Health Sciences. He is also Past-President of the Canadian Pain Society, International Association for the Study of Pain, Canadian Association for Dental research, and International Association for Dental Research. He is Editor-in-Chief of the Journal of Orofacial Pain, has co-authored/edited over 15 books, published over 350 journal articles and book chapters, and delivered over 450 invited lectures in numerous countries. His orofacial pain and neuromuscular research has been continuously supported by both CIHR and NIH. From 2008 to 2014 he was supported

by a Canada Research Chair (tier 1). His current research continues to investigate sensorimotor function and plasticity using primate and rodent models.

Microbiology

Dr. Dennis Cvitkovitch: Research by Dr. Cvitkovitch (PhD) and his lab is geared toward understanding the acid tolerance response of *Streptococcus mutans*, the principal agent of dental caries. Using a variety of molecular biological, biochemical and in silico technologies the group also studies the mechanisms of cell-cell signalling and its role in biofilm formation and genetic exchange by gram positive pathogens. Ongoing collaborative programs also include the search for potential vaccine targets for Streptococcus pyogenes infections and the effects of dental restorative materials on bacterial growth and metabolism. Dr. Cvitkovitch is a former holder of a Canada Research Chair (tier 2) and the Cvitkovitch lab has been supported primarily by CIHR.

Dr. Celine Levesque: The focus of research by Dr. Levesque (PhD) and her lab is antibiotic resistance and biofilm formation in oral bacteria. Of particular interest is quorum-sensing, the process of cell-to-cell communication in bacteria, and its role in the formation of multidrug-tolerant populations using the dental pathogen *Streptococcus mutans* as model organism. Her research has been supported by CIHR and NSERC and a Canada Research Chair (tier 2), which was renewed in 2016.

Dr. Tara Moriarty: The research by Dr. Moriarty (PhD) and her lab studies the details of dissemination mechanisms of blood borne microbes with a particular focus on spirochetes. The Lyme disease pathogen *Borrelia burgdoferi* serves as a model organism to determine vascular adhesion mechanisms and factors influencing motility in vascular dissemination. The lab further studies the role of diet-induced obesity in enhanced host susceptibility to disseminated Lyme disease and develops intravital imaging methods for studying periodontal disease and its association with cardiovascular disease. Research in the Moriarty lab is supported by multiple grants, primarily from CIHR and NSERC.

Dr. Dilani Senadheera: Research by Dr. Sendheera (PhD) and her lab focuses on molecular transport, signaling and virulence mechanisms in the cariogenic pathogen, *Streptococcus mutans*, at the molecular and genetic level. A second focus is to understand the composition and dynamics of the microbial communities present in the human body, and particularly in the mouth as a potential indicator of oral and systemic health. Her research has been supported by funds from CIHR.

Oral Pathology

Research in this theme focuses on mechanisms of (oral) cancer metastasis. The pathology service is further a resource for undergraduate and graduate research.

Dr. Grace Bradley: Dr. Bradley (DDS, MSc) is one of 6 oral pathologists who staff the diagnostic Toronto Oral Pathology Service (TOPS) at the Faculty of Dentistry. She has a research interest in virus-associated neoplasms in oral pathology. The over 6,700 annual (2015) accessions at TOPS form a valuable resource for research projects in oral pathology.

Dr. Marco Magalhaes: Dr Magalhaes is a clinician/scientist (DDS, PhD) with specialty training in oral pathology. He has established an active research program since 2015 with a general interest in the molecular dissemination mechanisms of cancer cells. His group studies specific cellular substructures known as invadopodia and their function during cell invasion. The lab has also developed animal models for *in vivo* analysis of cancer cell invasion and metastasis. These models further allow to study the role of immune cells in the metastatic process and to identify and test potential anti-metastatic drugs. As a junior investigator, his research is currently supported by a grant from the Canadian Cancer Society.

Education Research

This is the Faculty's most recent research theme. It comprises a range of topics that cross health disciplines in a variety of forms: program evaluation, student evaluation, basic science education and the theory and practice of education. The current goal is to position the Faculty of Dentistry to take on an international leadership role in this emerging domain of research and to expand a program of research in dental education that will have a positive impact on the faculty's pedagogical curriculum. The group is actively involved with the Wilson Centre for Research in Education, which is affiliated with the faculty of medicine at the University of Toronto. Awarding of the 2016 Karolinska Institutet Prize for Research in Medical Education to UofT Professor and Wilson Centre member Brian Hodges (Faculty of Medicine) demonstrates the general importance and recognition of this theme.

Dr. Laura Dempster: As the current lead member in this theme, research by Dr. Dempster (PhD) investigates experiences and explores improvements in dental education. She was recently awarded a research grant from the Canadian Foundation for Dental Hygiene Research and Education and the Canadian Dental Assistants Association to study the effect of noise levels on the health and well-being of dental hygienists. Dr. Dempster is also the President-Elect of the newly established Education Research group of the International Association of Dental Research (IADR).

Dr. Carilynne Yarascavitch, DDS, MSc, is a former Fellow of the Wilson Centre and currently the Director for the Dental Anesthesia Graduate Program at the Faculty of Dentistry. As a staff dentist and anesthesiologist she was recently appointed Director of the Education Research Unit at Sunnybrook Health Sciences Centre in Toronto where she leads a Heart and Stroke Foundation-supported Course for Advanced Cardiac Life Support. Her research employs mostly simulation studies to prepare dentists for the management of emergency situations.

Other

Dr. Anil Kishen: Dr. Kishen (BDS, PhD) has received education and training in clinical dentistry (endodontics) as well as basic science. He is one of the Faculty's most prolific researchers with scholarly activity in several areas, including biomechanics, biofilm-mediated infections, antimicrobial photodynamic therapy using functionalized nanoparticles, fiber-optic sensors, optical interferometry and interfacial tissue engineering.

His group employs several in vitro and in vivo model systems to study biomechanics of tooth/dentin hard issue, risk factors for fracture in root-filled teeth, Dentin hard tissue changes (*Pathological and Iatrogenic*), endodontic irrigation/fluid dynamics, host-biofilm interactions, hard tissue repair and stabilization strategies, photomechanical systems to characterize dental hard tissues in health and disease and controlled release systems for bioactive molecules. Even though his research is supported by relatively modest funds from the American Association of Endodontists Foundation and NSERC, his research productivity and impact is very high.

Dr. Howard Tenenbaum (DDS, PhD) is currently the Chief of the Department of Dentistry at Mount Sinai Hospital, after many years of an involved career in dental research. His research projects and accomplishments since the early 1980s involve studies on osteoblast differentiation, investigations on the effect of steroids on bone and its relationships to osteoporosis, studies on aryl hydrocarbon antagonist in bone formation and several elaborate studies (with M. Moayedi, see above) in temporomandibular joint/chronic pain. He continues to play an important role in positioning fundamental research within a clinical scenario, thus bridging the gap between basic science studies and clinical applications.

Research Funding

The table below shows a summary of research funds awarded to Faculty of Dentistry researchers from various sources during the past 8 fiscal years (April 1 to March 31).

Table 4.2: Funding Amount Awarded – Pro-rated to Grant Year (April to March)

Funding Source	2008	2009	2010	2011	2012	2013	2014	2015
	$ millions	$ millions	$ millions	$ millions	$ millions	$ millions	$ millions	$ millions
Tri-Agency	$3.825	$3.506	$3.107	$2.908	$2.796	$3.731	$3.995	$4.010
Institutional Initiatives	$1.214	$1.590	$1.165	$0.754	$0.578	$1.087	$0.866	$0.765
Government, Other	$1.563	$1.448	$1.428	$1.464	$1.210	$0.917	$0.752	$0.477
Corporate	$0.689	$0.532	$0.364	$0.504	$0.322	$0.746	$0.816	$0.746
Not-for-profit	$0.427	$0.374	$0.569	$0.862	$0.916	$0.818	$0.375	$0.379
Total	**$7.717**	**$7.449**	**$6.634**	**$6.491**	**$5.823**	**$7.299**	**$6.805**	**$6.377**

The total annual research funding at the Faculty of Dentistry is in the range of $6M to $7.5M. Annual fluctuations relate primarily to the global economic crisis of 2008 and the concomitant drop in tri-agency research funding between 2008 and 2012. The tri-agency funding appears to have since recovered with a record high of $4.01M in 2015, but support from all other funding sources (institutional, government, corporate, non-profit) has steadily declined. The reasons for this decline include the discontinuation of support for several individuals under government –initiated funding opportunities such as the Canada

Research Chair (CRC) program, reduced funds from not-for-profit organizations (hospitals, societies, foundations etc.) and declining success in the competition for international (e.g. NIH) research funds.

The active award count for the Faculty of Dentistry follows:

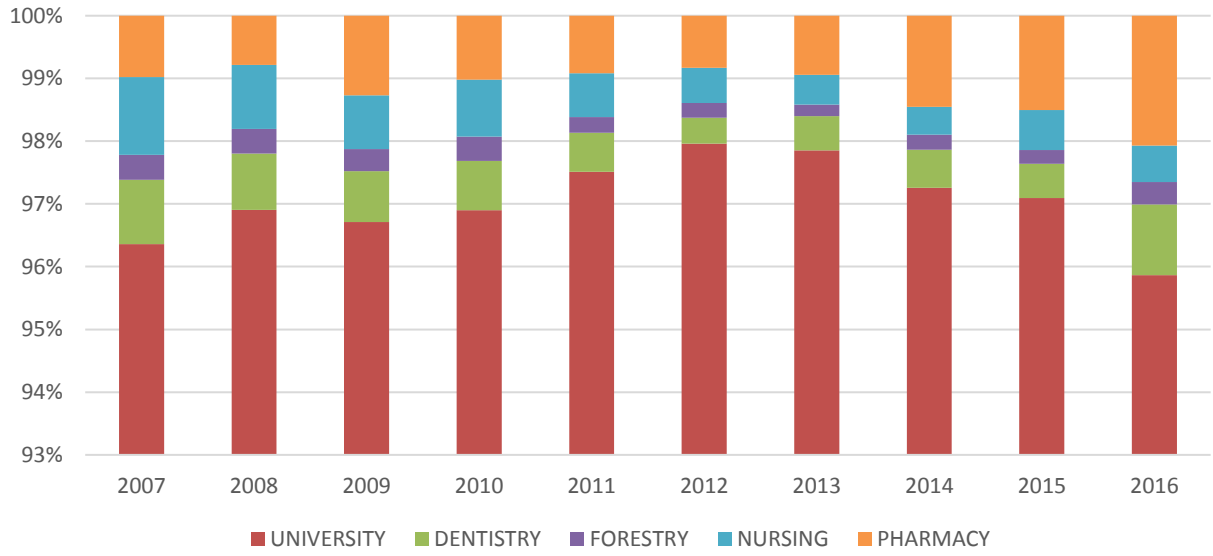
Table 4.3: Active Award Count – Pro-rated to Grant Year (April to March)

Funding Source	2008	2009	2010	2011	2012	2013	2014	2015
Tri-Agency	42	36	36	35	34	45	42	42
Institutional Initiatives	13	15	16	17	11	12	14	10
Government, Other	12	13	8	11	11	7	4	3
Corporate	11	11	7	8	9	12	12	9
Not-for-profit	30	27	27	25	25	25	22	18
Total	**108**	**102**	**94**	**96**	**90**	**101**	**94**	**82**

The overall number of individual grants at the Faculty of Dentistry in the respective categories has remained relatively constant only for tri-agency funding sources, while others have seen a moderate (institutional Initiatives, Corporate) or severe (government, not-for-profit) decline. The general consensus among the scientific community is that this declining trend can and will be reversed after 2016 following the recent change in federal government.

A comparison with other single department Faculties (SDF) at the University of Toronto such as Pharmacy, Forestry, and Nursing is shown below.

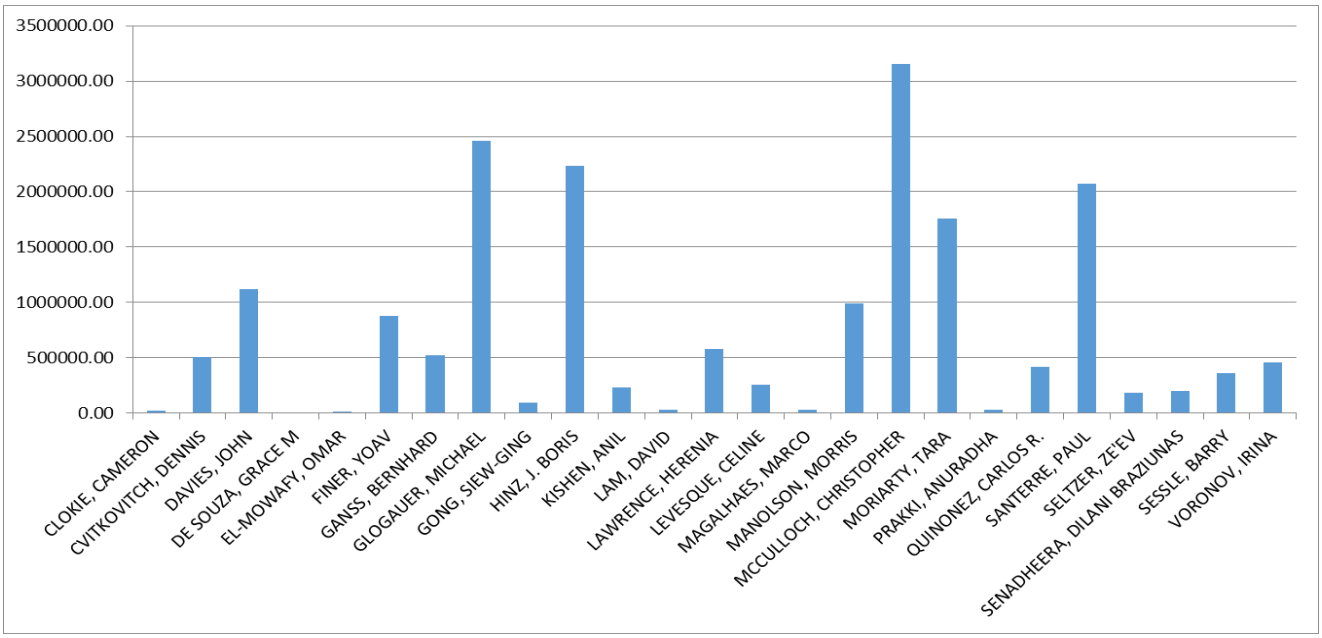
Table 4.4: Total Funding Comparison - Various Departments (April 2007 to March 2016)



Although the absolute amount of research funds attracted by the Faculty of Dentistry in 2016 appears that it may be the lowest in the past 5 years (data incomplete), the amount relative to the total university funds is the highest since 2007.

In summary, the total funding for the Faculty of Dentistry is primarily and consistently provided by tri-agency sources (primarily CIHR), while other sources provide variable funds. The Faculty of Dentistry compares favorably with the funding development of the university and other SDFs with the exception of Faculty of Pharmacy, which has been able to attract increasing funds.

Table 4.5: Total Funds per PI (September 2011 to August 2016)



Twenty-five investigators at the Faculty of Dentistry have held competitive research funds over the past 5 years (September 2011 to August 2016).

Benchmarking

Scholarly output and citation count of UofT in the subject area "dentistry" were both compared with our national peers and some select U.S. universities with a traditionally strong dental research record.

The following observations were made. When compared with our national peers, the Faculty of Dentistry at UofT ranks highest in both scholarly output and citation count. When compared with some leading U.S. peers, UofT ranks intermediate in both scholarly output and citation count. Among the U15 universities in Canada, the Thompson-Reuters data show that it ranks number one in publications and number one in citations in the field of Dentistry, Oral Surgery and Medicine. When compared with the public universities in the Association of American Universities (AAU), it ranks fifth in publications and seventh in citations.

Table 4.6: Field of Study: Dentistry, Oral Surgery & Medicine (Thomson-Reuters Research Area Category)

Dentistry, Oral Surgery & Medicine covers resources on the anatomy, physiology, biochemistry, and pathology of the teeth and oral cavity. This category includes specific resources on periodontal disease, dental implants, oral and maxillofacial surgery, oral pathology, and oral surgery. Coverage also includes resources on community dentistry, public health dentistry, and pediatric dentistry.

Scope notes: http://ip-science.thomsonreuters.com/mjl/scope/scope_sci/#FY
Journal list: http://science.thomsonreuters.com/cgi-bin/jrnlst/jlresults.cgi?PC=K&SC=FY

Please note this includes all faculty at the University of Toronto who publish in the area of 'Dentistry, Oral Surgery & Medicine'.

It is not limited to faculty in the Faculty of Dentistry.

Note: * indicates a tie

Publications Rankings			
Institution Short Name	**All Peers**	**Public Peers**	**U15 Peers**
Harvard	1		
Michigan	2	1	
New York U	3		
N Carolina - Chapel Hill	4	2	
U Washington	5	3	
Florida	6	4	
TORONTO	7	5	1
U Penn	8		
Minnesota	9	6	
Southern California	10		
Calif - San Francisco	11	7	
Ohio State	12	8	
Indiana	13	9	
Iowa	14	10	
BRITISH COLUMBIA	15	11	2
Calif - Los Angeles	16	12	
Columbia	17		
SUNY - Buffalo	18	13	
Boston U	19		
Pittsburgh	20	14	
Rochester	21		
MCGILL	*22	*15	3
Rutgers State	*22	*15	
Case Western Reserve	24		
ALBERTA	25	17	4
SUNY - Stony Brook	26	18	
DALHOUSIE	27	19	5

Citations Rankings			
Institution Short Name	**All Peers**	**Public Peers**	**U15 Peers**
Harvard	1		
Michigan	2	1	
U Washington	3	2	
New York U	4		
N Carolina - Chapel Hill	5	3	
Minnesota	6	4	
U Penn	7		
Florida	8	5	
SUNY - Buffalo	9	6	
Southern California	10		
TORONTO	11	7	1
BRITISH COLUMBIA	12	8	2
Ohio State	13	9	
Calif - San Francisco	14	10	
Calif - Los Angeles	15	11	
Iowa	16	12	
Columbia	17		
Indiana	18	13	
Boston U	19		
Pittsburgh	20	14	
Rochester	21		
MCGILL	22	15	3
Rutgers State	23	16	
Case Western Reserve	24		
Johns Hopkins	25		
WESTERN	26	17	4
MONTREAL	27	18	5

MANITOBA	28	20	6
WESTERN	29	21	7
Johns Hopkins	30		
Colorado Boulder	31	22	
MONTREAL	32	23	8
Emory	33		
LAVAL	34	24	9
Stanford	35		
Chicago	36		
Cornell	37		
Duke	38		
Northwestern	39		
Washington U	40		
SASKATCHEWAN	41	25	10
Yale	42		
Kansas	43	26	
OTTAWA	*44	*27	11
Wisc - Madison	*44	*27	
Maryland - Coll Park	*46	*29	
MCMASTER	*46	*29	12
Purdue	*46	*29	
Vanderbilt	*46		
CALGARY	50	32	13
Calif - Berkeley	*51	33	
Tulane	*51		
Calif - Davis	*53	*34	
Rice	*53		
Virginia	*53	*34	
Calif - Irvine	56	36	
Arizona	*57	*37	
Texas A&M College Stn	*57	*37	
Calif - San Diego	*59	*39	
Illinois - Urbana	*59	*39	
Missouri Columbia	*59	*39	
Brown	*62		
Penn State	*62	42	
Georgia Inst Tech	64	43	
Texas - Austin	65	44	
Mass Inst Tech	66		
Oregon	67	45	
Princeton	*68		
WATERLOO	*68	46	14
Michigan State	70	47	
Calif - Santa Barbara	*71	*48	
Caltech	*71		

Colorado Boulder	28	19	
DALHOUSIE	29	20	6
ALBERTA	30	21	7
LAVAL	31	22	8
MANITOBA	32	23	9
Emory	33		
Stanford	34		
SUNY - Stony Brook	35	24	
Chicago	36		
Washington U	37		
Calif - Berkeley	38	25	
Northwestern	39		
Duke	40		
Cornell	41		
SASKATCHEWAN	42	26	10
Purdue	43	27	
Wisc - Madison	44	28	
OTTAWA	45	29	11
Missouri Columbia	46	30	
Rice	47		
Yale	48		
Brown	49		
Virginia	50	31	
Kansas	51	32	
Calif - Davis	52	33	
CALGARY	53	34	12
Maryland - Coll Park	54	35	
Arizona	55	36	
MCMASTER	*56	37	13
Vanderbilt	*56		
Georgia Inst Tech	58	38	
Mass Inst Tech	*59		
Tulane	*59		
Calif - San Diego	61	39	
Calif - Irvine	62	40	
Illinois - Urbana	63	41	
Oregon	64	42	
Princeton	65		
Texas - Austin	*66	*43	
Texas A&M College Stn	*66	*43	
Penn State	68	45	
WATERLOO	69	46	14
QUEEN'S	70	47	15
Michigan State	71	48	
Iowa State	72	49	

Iowa State	*71	*48	
QUEEN'S	*71	*48	15
Brandeis	75		
Oregon	76	50	

Caltech	73		
Calif - Santa Barbara	x	x	
Rice	75		
Oregon	76	50	

Data Sources:

InCitesTM, Thomson Reuters (2012). Data Source: Web of Science ®.

Report Created: Jan 18, 2016. Includes Web of Science content indexed through 2015-12-12.

This data is reproduced under a license from Thomson Reuters.

Additional information on institution classification: University of Toronto

Definitions:

1. Publication counts (articles, notes, and reviews as found in Thomson Reuters-covered journals; other types of items and journal marginalia such as editorials, letters, corrections, and abstracts were omitted) published between 2010 and 2014.

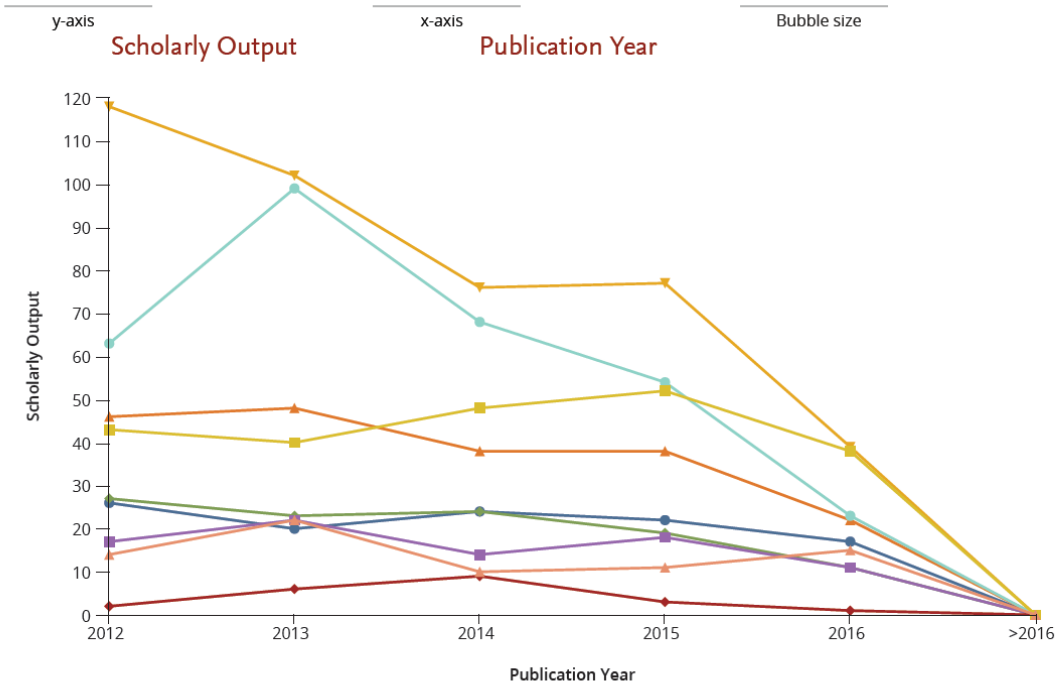
2. Citation counts represent citations-to-date for papers published between 2010 and 2014, as at Jan 2016.

3. Each Research Area is defined by a set of journals indexed by Thomson Reuters; there is overlap between fields.

4. Data in this file are limited to 76 institutions, all leading research universities in North America [members of the U15 and/or the Association of American Universities (AAU), plus UC San Francisco].

Benchmarking

View data sources | 2012 to >2016 | Dentistry | ASJC



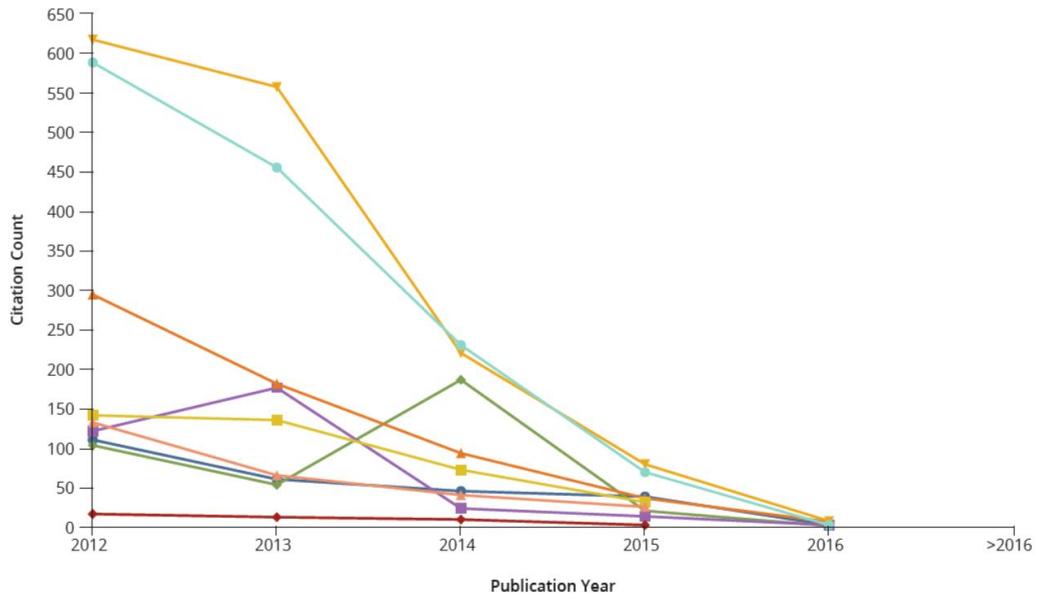
Institutions and Groups

- Dalhousie University
- McGill University
- Universite Laval
- Universite de Montreal
- University of Alberta
- University of British Columbia
- University of Manitoba
- University of Saskatchewan
- University of Toronto

Benchmarking

View data sources | 2012 to >2016 | Dentistry | ASJC

y-axis: Citation Count | x-axis: Publication Year | Bubble size



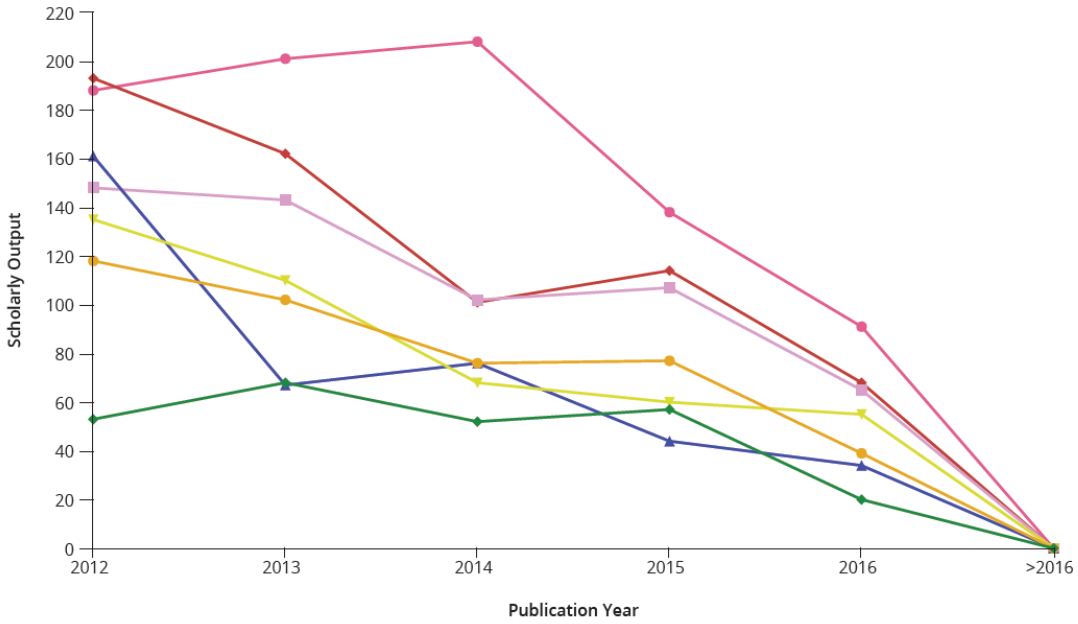
Institutions and Groups

- Dalhousie University
- McGill University
- Universite Laval
- Universite de Montreal
- University of Alberta
- University of British Columbia
- University of Manitoba
- University of Saskatchewan
- University of Toronto

Benchmarking

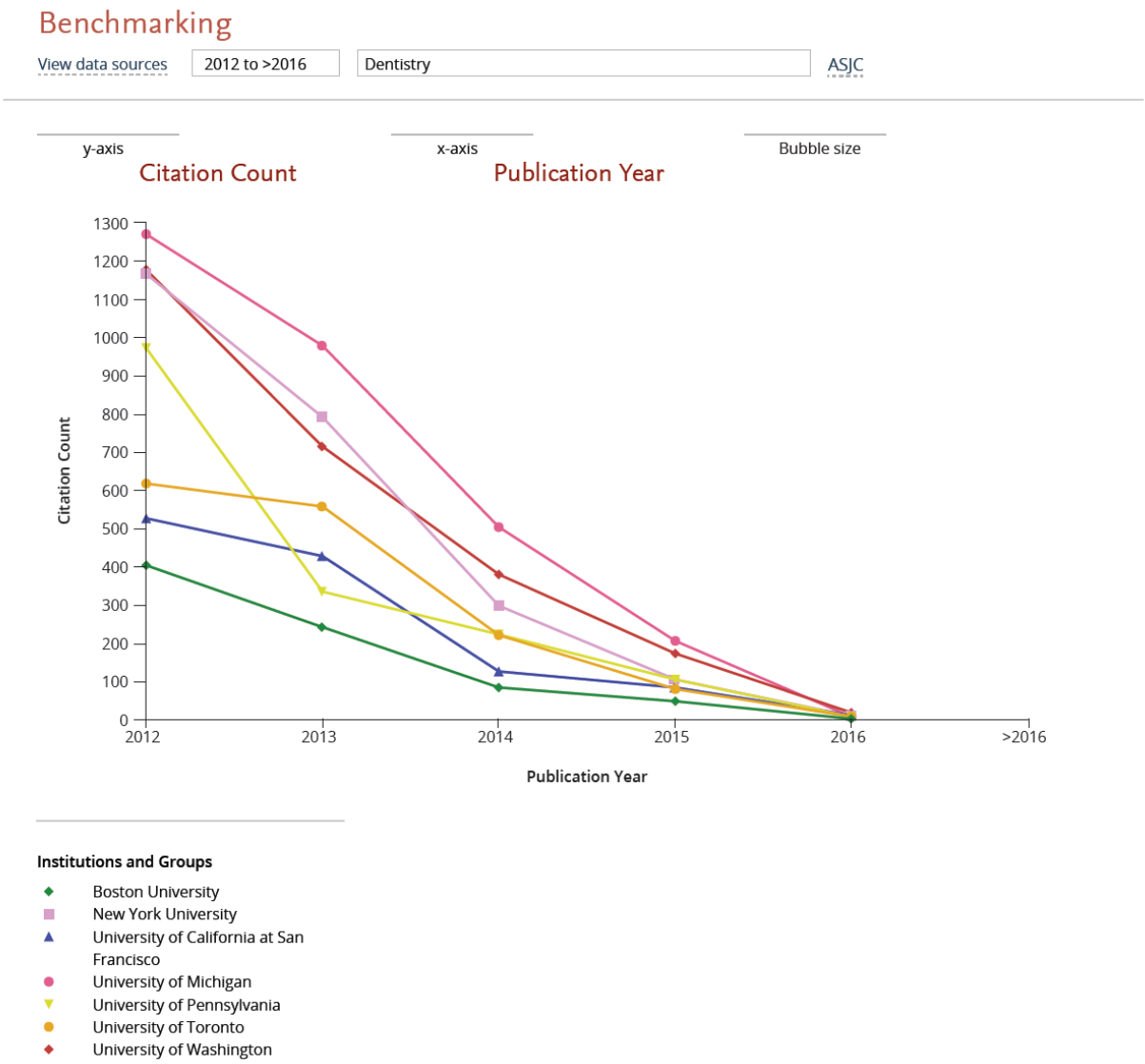
View data sources | 2012 to >2016 | Dentistry | ASJC

y-axis: Scholarly Output | x-axis: Publication Year | Bubble size



Institutions and Groups

- Boston University
- New York University
- University of California at San Francisco
- University of Michigan
- University of Pennsylvania
- University of Toronto
- University of Washington



Collaborations

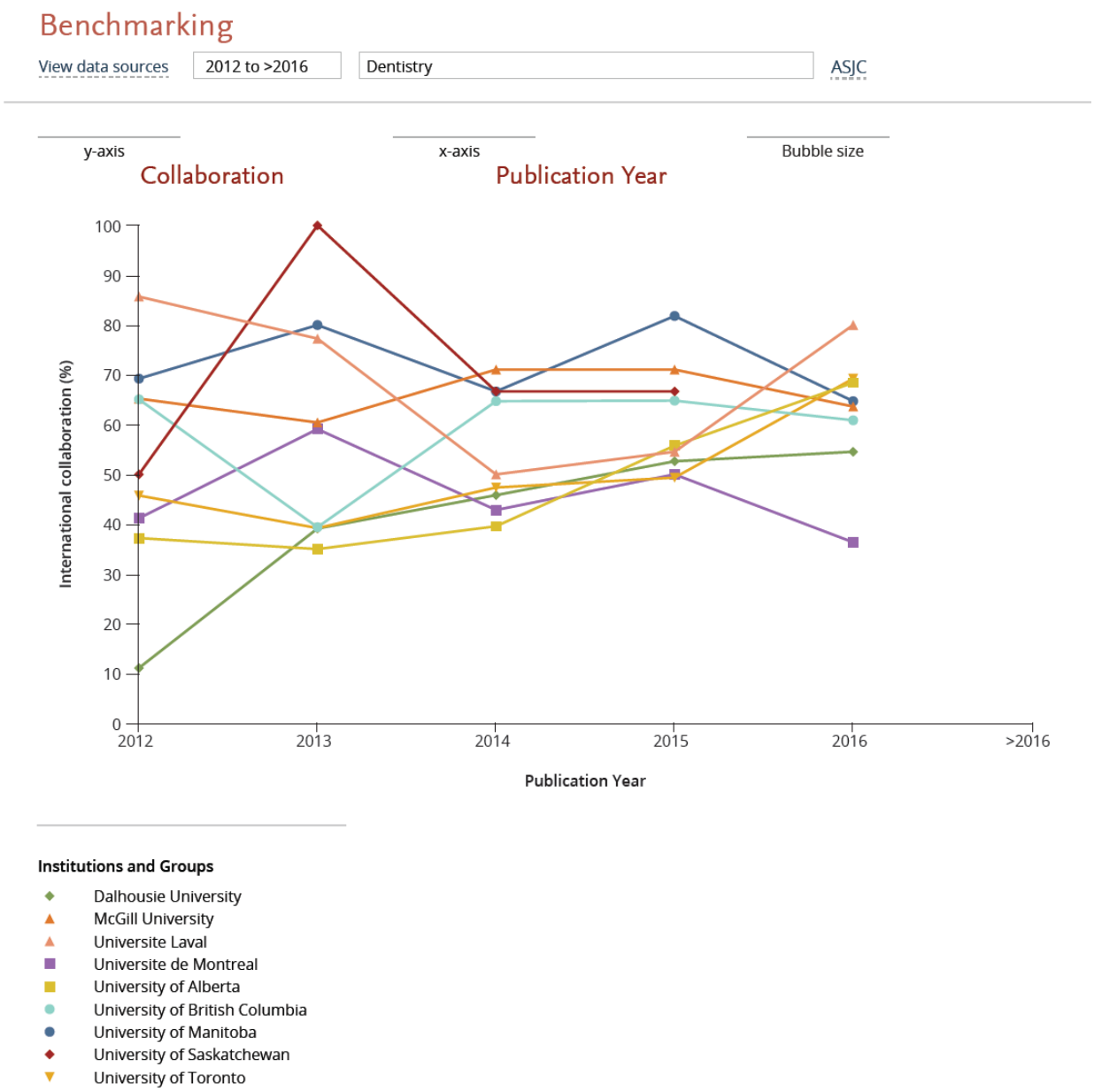
To assess the level of collaboration, the following metrics were used:

1. The level of national and international collaboration, both compared to other Canadian dental schools

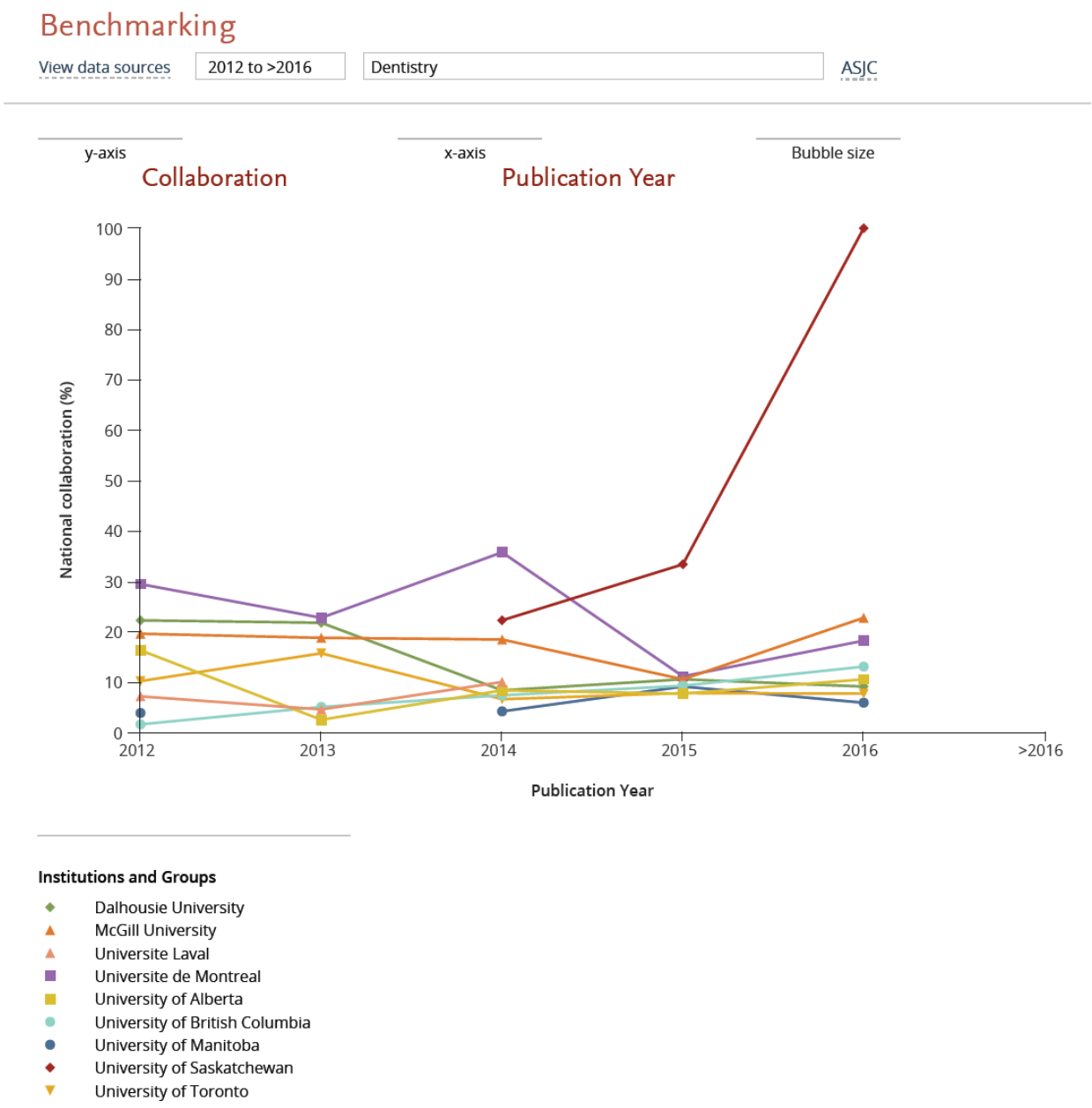
2. The level of national and international collaboration, both compared to selected U.S. dental schools.

The following results were found utilizing SciVal™ as the data source. When compared with our national peer Faculties, our Faculty of Dentistry ranks low in the extent of national and international collaborations. When compared to a number of U.S. peer faculties, our Faculty of Dentistry ranks very low in the level of national collaborations and intermediate in the level of international collaborations.

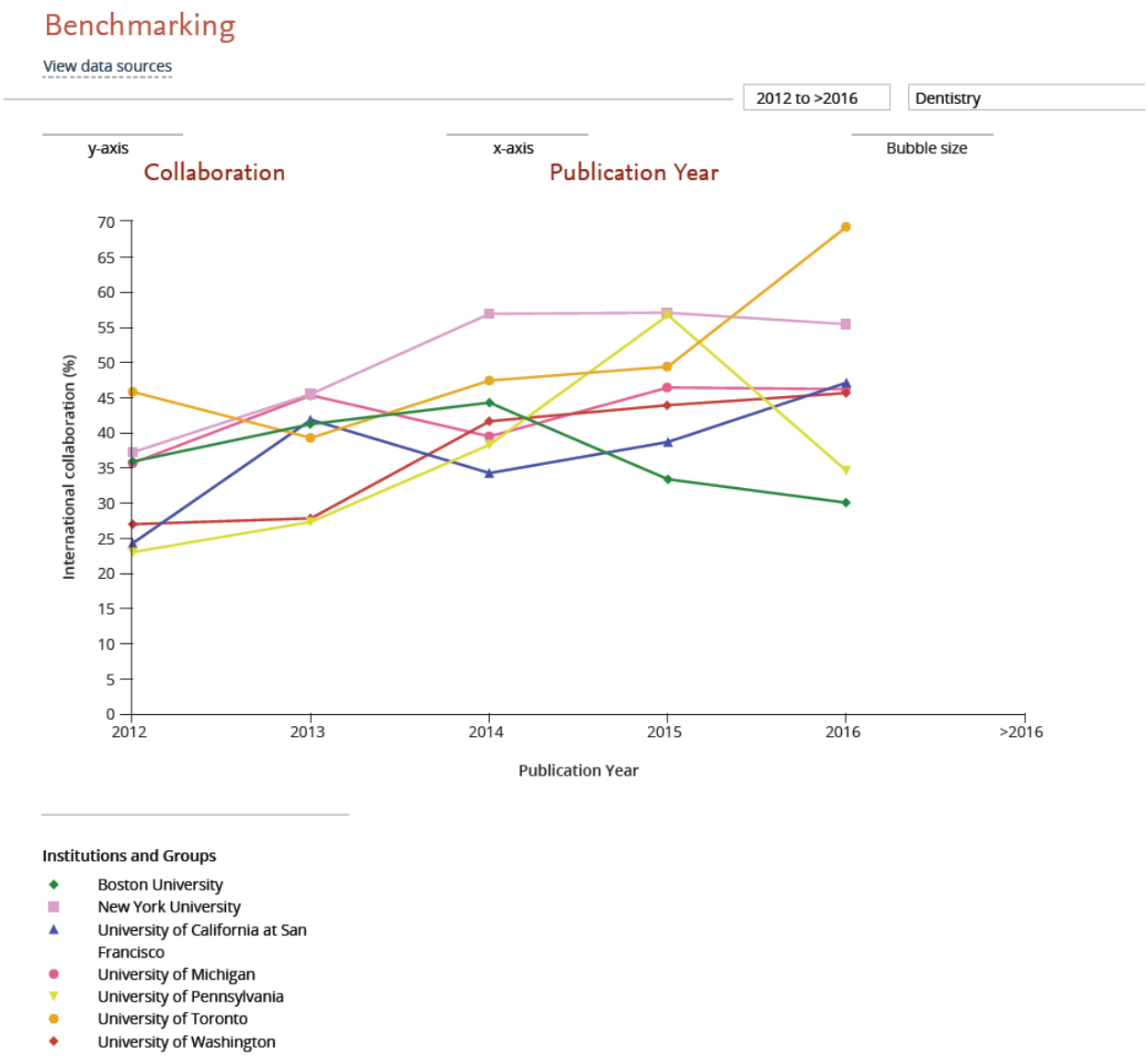
National Collaborations Compared to Other Canadian Dental Schools



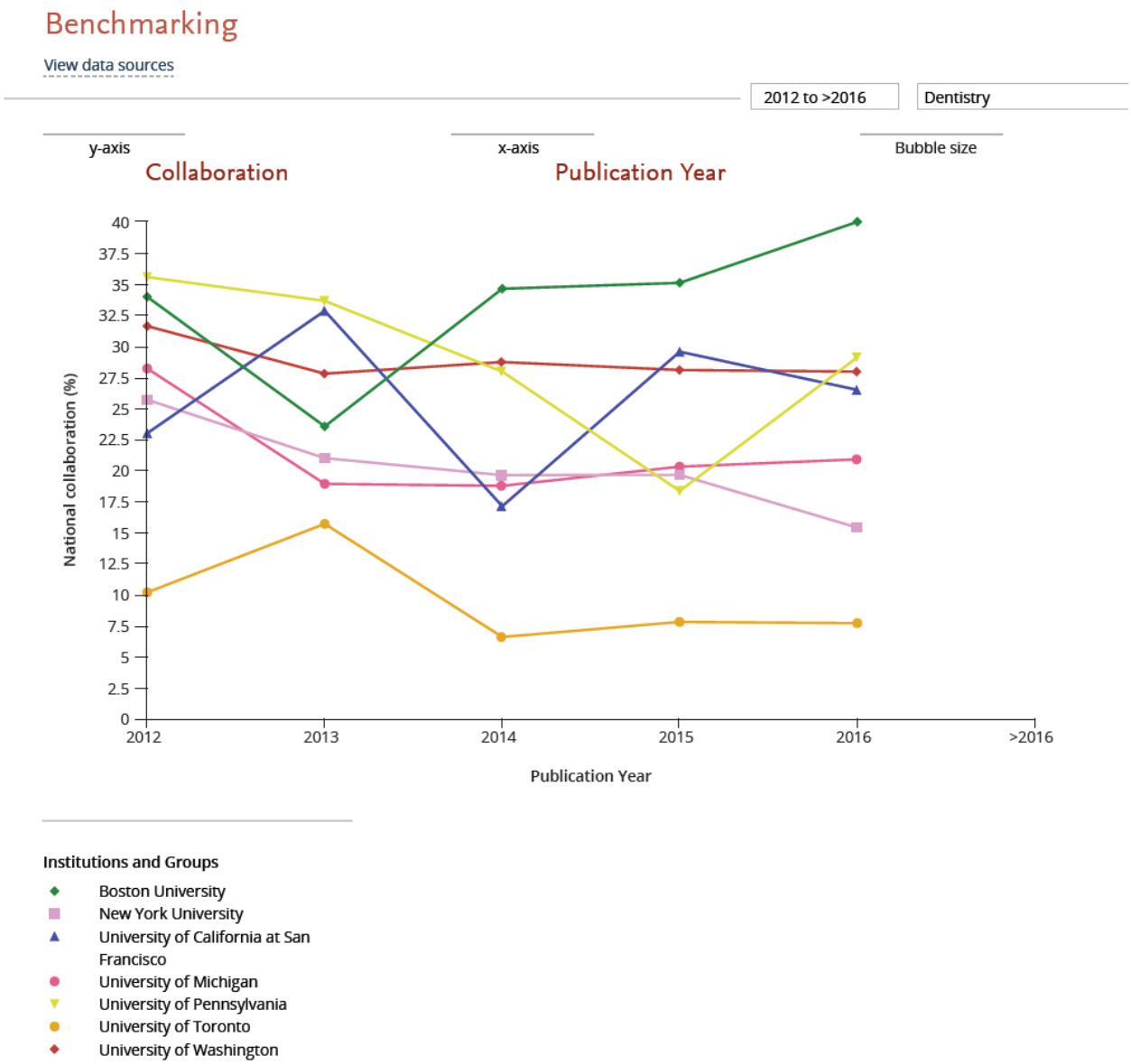
International Collaborations Compared to Other Canadian Dental Schools



National Collaborations Compared to Selected U.S. Dental Schools



International Collaborations Compared to Selected U.S. Dental Schools



Economic Impact

Metrics for economic impact for the Faculty of Dentistry show that in the past 5 years we have had 30 confidential invention disclosures, 2 patents filed, 2 licenses issued, and one start-up company formed.

Support for Undergraduate and Graduate Students

The broadly distributed research activities of faculty provide excellent opportunities for the engagement of undergraduate and graduate students.

To this end, the Faculty offers an undergraduate summer research program that is open to undergraduate students from all Canadian dental schools, coordinated by a senior, research-focused faculty member (currently Dr. B. Hinz). The program provides opportunities for summer students to gain experience in laboratory and clinical research. An average of 15 to 20 students per year engage in research projects across all dental disciplines during the summer months (June to August). Closely mentored by faculty or senior staff, the majority of students participate in this program after completion of first and/or second year of their D.D.S. training. At the conclusion of the 3-month research period, students present their work and compete for internal awards that allow them to present their findings at local, national or international conferences. Over the years, several undergraduate summer students have won prestigious awards, e.g. the IADR Unilever Hatton research awards in the junior category. To most students, this program presents an opportunity to engage in research over a wide range of topics as a complement to their dental education.

The Faculty also offers 2 different research-based graduate programs, one leading to traditional thesis-based M.Sc. or Ph.D. degrees for individuals with an interest in oral health research and the other leading to an M.Sc. or Ph.D. degree in conjunction with dental specialty training, as described in the section on Academic Programs. Over the past 5 years, the Faculty has awarded 178 graduate degrees, 24 Ph.D. and 31 M.Sc. degrees in the traditional research stream, and 123 M.Sc. degrees for research in clinical specialty programs (10 in Prosthodontics, 18 in Periodontics, 16 in Pediatric dentistry, 18 in Orthodontics, 13 in Oral Surgery, 6 in Oral Radiology, 3 in Oral Pathology and Medicine, 15 in Endodontics, 15 in Dental Public Health and 9 in Dental Anesthesia). Although the Faculty does not (yet) maintain a database tracking the career development of their graduates, the majority of recent graduates in the traditional M.Sc. and Ph.D. programs secure employment in academia or the private sector. Some continue with further post-doctoral or clinical training, often at national or international dental schools, with the intention to pursue an academic career that involves an active research program. Graduates in the clinical specialty programs pursue a career in their respective clinical specialties, but often maintain ties with academic institutions, e.g. as part-time instructors.

Further, the Faculty engages their students in an annual Research Day where most undergraduate and graduate research is displayed in poster format. Selected best undergraduate and graduate work in basic science and clinical disciplines is invited for oral

presentations. In separate categories, post-doctoral fellows and research associates are invited to present their research, and travel awards are given out in each of the categories. This is an all-day event that follows a specific theme (2015: Focus on new Researchers) and features a keynote speaker who is selected by a mainly student-run organizing committee.

Postdoctoral Fellows

As of September 2016, the research facilities at the Faculty of Dentistry have engaged 45 postdoctoral fellows (PDFs) over the past five years, 16 of which are currently active. These research trainees come to our Faculty to further their scientific career and to develop skills in preparation for their future as independent scientists. Their home universities, defined as where they have received their last doctorate degree, are spread globally and include renowned institutions in Asia (China, Japan, Iran) Australia, North and South America (US, Brazil) and Europe (Germany, UK, Spain, Portugal, France). PDFs have been instrumental as lead or co-authors in the publication of 85 peer-reviewed articles over the past 5 years and thus carry a significant proportion of the Faculty's scholarly research output. This productivity has positively contributed to the successful employment of PDFs following their engagement at the Faculty of Dentistry in academic and educational institutions as well as the private sector. Current challenges include recent changes to work permit and immigration programs, particularly the Labour Market Impact Assessment criteria, which have impacted the recruitment of international trainees and created some barriers to international collaborations. These programs have also increased administrative workload and cost.

Challenges

The current funding climate has resulted in a decrease in the success rate of grant applications from all sources. As such the Faculty is now introducing a means to review all grant applications before submission. With the help of a newly hired (January 2016) Research and Business development Manager, an internal grant review program has been initiated. This program has been rolled out for the major upcoming 2016 CIHR (Foundation and Project Schemes) and NSERC (Discovery Grants Program) funding opportunities. The fundamental idea of this review program is to solicit evaluations from scientists external to the Faculty of Dentistry during the grant development phase. Specific forms for reviewers with questions that are tailored toward the specific granting agency and opportunity have been developed to improve focus and competitiveness of any submitted applications. A central database of all submitted applications has been created and this will serve as a tool to critically review unsuccessful submissions, reasons for rejection, and develop strategies for improvement.

Junior faculty members are particularly sensitive to the need for grant success. To assist this particular group of investigators a specific mentoring program has been initiated that not only provides continuous mentorship meetings with the junior candidates, but specific funds have been reserved for the improvement of previously unsuccessful research grant application from junior (pre-tenure) faculty.

The lack of an efficient communications platform among the research community has been identified in a previous external review of the research operations at the Faculty of Dentistry. In response, monthly "Research Rounds" have been established. Every Faculty member with a current or emerging interest in research is invited to contribute to discussions at these meetings, and this new communication platform has proven valuable to develop revitalization plans and, more recently, successfully compete for major government and institutional support to renovate the entire research infrastructure with an anticipated construction start of January 2017. In the context of this renovation the historical segregation of research labs into two major sites at the Faculty building (124 Edward Street) and the Fitzgerald building (150 College Street) dating back to 1974 will end, and the vast majority of Faculty of Dentistry research will again be conducted in one building.

5. CLINICAL SERVICE

Scope of Activities

The Faculty of Dentistry is Canada's largest dental school. The 293 chair facility's catchment area includes the Greater Toronto Area and beyond into various regions of Southern Ontario. The Faculty treats 15,000 patients yearly, encompassing more than 78,000 appointments per year in the various clinics located throughout the building.

The majority of the patients treated at the Faculty are classified as the working poor. They most often attend the Faculty because of the fees for services that generally run approximately 50% relative to the fees levied in private practice. The Faculty receives $7M yearly from this revenue, which translates to an even greater value in service for these patients in the community. For those who have difficulty accessing care in private practice, studies have shown that hospital emergency rooms are often the site for treatment, which is an inappropriate use of government resources. According to a survey done at the Faculty in 2014, the patient population, the Faculty of Dentistry treats unique subsets of the population that are predominately:

- women
- older Ontarians
- recent immigrants or refugees
- lower-income Ontarians
- adults without dental coverage

The survey also indicated that Faculty patients are more likely to face disproportionately greater challenges that include, but are not limited to:

- poorer oral health indicators
- access to care barriers
- food insecurity

The Faculty of Dentistry initiated an Access to Care fund over ten years ago to address the pressing financial issues facing our patient population. The Access to Care fund is comprised of significant funds donated by private and corporate donors on an annual basis. Students identify patients in need, who require 'life-changing dental procedures' but are otherwise unable to access care for financial reasons. Three real benefits are realized when the Access to Care funds are applied to a particular case:

1) Patients receive the care, they would otherwise have to forgo, that is critical to their ability to function in daily life.
2) Students develop the sense of social responsibility integral to the health care professions.
3) Students receive the benefit of an enriched clinical experience that otherwise they may have missed out of due to limited patient finances.

The Faculty of Dentistry at the University of Toronto is the only Canadian Faculty of dentistry that provides clinical training in all dental specialties in addition to an undergraduate program in general dentistry. Because the scope of the clinical services

between the undergraduate and the graduate programs both differs and complements each program, each will be addressed separately in the following section.

Undergraduate Program

The clinical program has its genesis in the in preclinical program where 96 undergraduate dental students in first and in second year develop their clinical skills in specifically designed pre-clinical simulation labs. It is here where these students learn the technical skills required to treat live patients in the subsequent third and fourth years of the undergraduate dental program. These skills include, but are not limited to,

- proficient use of both high speed and slow speed dental handpieces for the purposes of restorative dentistry.
- basic hand sills for periodontal procedures (i.e. scaling and root planing).
- proper preparation and implementation of a variety of dental materials.
- the initial access preparation, identification, cleaning, shaping and filling of the roots of single and multi-rooted teeth.
- the planning and implementation of multiple areas of removable and fixed prosthodontics, including dental implants
- an introduction to removable and fixed orthodontics.
- the unique clinical challenges encountered in the treatment planning and technical procedures inherent to pediatric dentistry.
- and others.

The overall objective of the preclinical program is the that undergraduate students, at the completion of the second dental year (and the International Dental Advanced Placement Program [IDAPP] students at the completion of their calibration program) will be proficient in the technical skills of dentistry so that they are able to manage a limited number of minor and adult patients under supervision in a clinical setting at the commencement of the third dental year.

In reality, undergraduate dental students have their first exposure to the clinical setting in first dental year. The Comprehensive Care Program (CCP), the core program in general dentistry, spans all four years of the dental program. In first year, dental students access the clinic to familiarize themselves with the clinical setting, the principles of infection control and proper chairside positioning. These clinical skills are mastered through a combination of students acting as both operator and patient and through a number of dental assisting experiences to upper year and graduate dental students operating throughout the Faculty.

In second dental year, students have a limited exposure to live patients through a comprehensive periodontal recall program. In this program, students manage a very limited number of patients who have had the majority of their dental treatment completed in the past, but return to the Faculty on a regular basis for periodontal maintenance purposes (i.e., regular teeth cleanings). By the completion of the second year, students are competent in providing these services under supervision of their assigned instructors.

It is at the start of the third dental year where the clinical experience begins in earnest. The IDAPP students merge with the D.D.S. class for a total of 120 students. These students are assigned a number of new and continuing care patients, for which they are responsible, to ensure the timely delivery of all aspects of general dental care. Students manage these patients during assigned time in the third year clinic under the supervision of treatment planning coordinators and instructors in the disciplines of periodontics, restorative dentistry, prosthodontics and endodontics. Students attend this clinic 2.5 days per week, in sessions that take place during 3-hour sessions occurring in the morning or the afternoon of any given day.

Third year students attend ancillary clinics dedicated to individual disciplines of dentistry when not assigned in the general CCP clinic. These ancillary clinics include oral diagnosis, oral radiology, emergency, oral surgery and pediatric dentistry. In these ancillary clinics, students do not manage their own patients, rather they contribute to the individualized care of patients progressing through the number of patient pathways within the Faculty.

The final year of the dental program is predominately clinical. The overall structure of this year is similar to third year in its composition, but differs in intensity. Students at this level elevate their skills at a rapid rate and are able to confidently treat a greater number of complex cases to completion. In addition, Fourth year students rotate through a number of off-site locations in order to enhance their exposure to dentistry in a variety of community clinical settings.

Graduate Programs

The Faculty has 9 graduate dental programs that incorporate clinical training of 3 to 4 years duration. The specialty of Dental Public Health does not incorporate clinical training at the Faculty. Each program has up to 4 students registered and each program may or may not have a Dental Specialty Advanced Training Program (DSATP) registered for a defined period of time. These programs include:

- Dental Anaesthesia
- Endodontics
- Oral and Maxillofacial Radiology
- Oral and Maxillofacial Surgery
- Oral Medicine and Pathology
- Orthodontics
- Paediatric Dentistry
- Periodontics
- Prosthodontics

Graduate students deliver care at a level comparable to a dental specialist. The cases treated by these students are referred internally via the undergraduate program, externally via referral from private practice or in disciplines like orthodontics and paediatric dentistry, via self-referral. The fees for these specialty services are approximately half of

private practice, although complex prosthetic cases involving full–mouth rehabilitation with dental implants can generate fees in the tens of thousands of dollars.

Patient care is often shared between the undergraduate and graduate clinics. It is not usual for the overall management of a patient to be the responsibility of an undergraduate student with referral to applicable specialists when warranted. Once the particular treatment is delivered by the graduate student, the patient is returned to the undergraduate student for completion of his or her comprehensive care.

Outreach to Local and International Communities

The Faculty continues to develop and to expand its community outreach programs at the municipal, provincial and international levels. Offsite outreach programs serve a dual purpose: they provide care to populations that would otherwise have difficulty or be unable to receive the care that they require and they provide unique educational opportunities for students that would not be possible within the Faculty facility. While the coordination of the various off-site rotations can be a challenge from both logistical and time-availability perspectives, the integration of rotations into the schedule has increased at a rate of one rotation per year for the past four years.

The objective of each offsite rotation must be of a pedagogical nature to be considered. At present, each particular rotation provides a unique element to undergraduate dental education. The table below outlines the offsite rotations currently offered at the Faculty of Dentistry.

Site	Learning Objective(s)	Number of ½ Days	Evaluation
Mount Sinai Hospital	Management of adult patients with disabilities	4	Faculty grades
CAMH	Management of the adult patient with diagnosed mental illness	2	Mandatory Attendance
St. Michael's Hospital	Management of the adult patient in conjunction with Dental Public Health	2	Qualitative Assessment
City School Clinics	Management of children in conjunction with Dental Public Health	4	Faculty grades
George Brown College	Delivery of care in a team setting	2	Mandatory Attendance

Regent Park (starting fall of 2016)	Management of a population in urgent need of care	2	Qualitative Assessment
Moose Factory	Delivery of care in a hospital setting to Indigenous peoples	16 (elective based, awarded in part on merit)	Attendance
Addis Ababa, Ethiopia	Assist in education of dental students in Africa	16 (elective based, awarded in part on merit)	Attendance
Uganda	Delivery of care in a team setting in remote area of Uganda to peoples in need	8 (elective based, awarded in part on merit)	Attendance

The Faculty's future vision incudes the continuation of the current rotations, while continuing to explore and implement new areas of education and service. Recognizing that clinical time in the Faculty clinics is critical for students, as the number of clinical rotations increases, there may be greater emphasis placed on elective programs or novel ways of delivering these rotations while maintain the clinical experience the students enjoy.

Contribution to Teaching Mission

Dentistry is unique in the University setting in that it contains a technical program within an academic institution. The clinical program exists to train students to be general practitioners and dental specialists. These unique requirements of the program dictate that a large proportion of faculty time is designated for clinical teaching. At present, there is relatively little connection between the research that is done in labs of the Faculty and the teaching of dentistry on the clinic floor, but this situation has been identified as one requiring improvement for the overall greater good.

The clinical program relies heavily on part-time clinical instructors. At present, approximately 500 part-time instructors rotate though the various Faculty Clinics. The majority of the part-time instructors are practicing dentists who designate time from their practices to travel to the Faculty for either a half or a full day on the clinic floor. These clinical instructors are considered employees of the University of Toronto, have a contract and are paid a per diem.

At the undergraduate level, the clinical program encompasses an increasing proportion of the curriculum as the student progresses through the program. In the first year of the program, students spend approximately 30 to 40 percent of their time in preclinical and clinical programs. In the second year, this number increases to approximately 50 percent, by third year, clinical teaching makes up approximately 70 percent of the curriculum and by fourth year, this number has increased to 90 percent.

All graduate programs are three years in length, of which 2 of the 3 years are clinical. The third year provides protected time for research, however, much of this time is used to complete clinical cases and to maintain clinical skills. Graduate students are exposed to didactic courses throughout their tenure. Many of these courses are self-taught or are seminar based. Most graduate programs are clinically based so that the vast majority of time is spent in clinic mastering specialty skills. In programs like oral and maxillofacial surgery, oral pathology and medicine and pediatric dentistry, a significant proportion of a students' learning occurs in a hospital setting. While in most cases a graduate student's clinical work is independent of their research, it is not unusual for there to be some degree of overlap, particularly if the student is conducting a clinical study as part of his or her research.

Contribution to Research Mission

The Faculty clinics are available to all disciplines in order to support all forms of research endeavours. The study of pain continues to be a foci of investigation. More recently, implant studies and the efficacy of a number of periodontal procedures have gained in popularity. In order to conduct a study, principal investigator contacts the Assistant Dean, Clinics, who designs a contract for utilization of the clinical areas for support of the study. Funding for clinical research may be covered by a grant is the study is of sufficient magnitude or internally through a defined budget if the study is relatively small.

The majority of clinical research is conducted by graduate students engaged in the various disciplines. Some clinical research has been undertaken by undergraduate students engaged in research during the summer breaks, but this utilization is significantly less common. At present, as expected, there is no utilization by the basic science students. There would be definite benefit to the promotion of interaction between the basic sciences and the clinical setting so that dental students could enhance their understanding of the basis of decision-making and their comprehension of the materials that they use on a routine basis.

6. ORGANIZATIONAL & FINANCIAL STRUCTURE

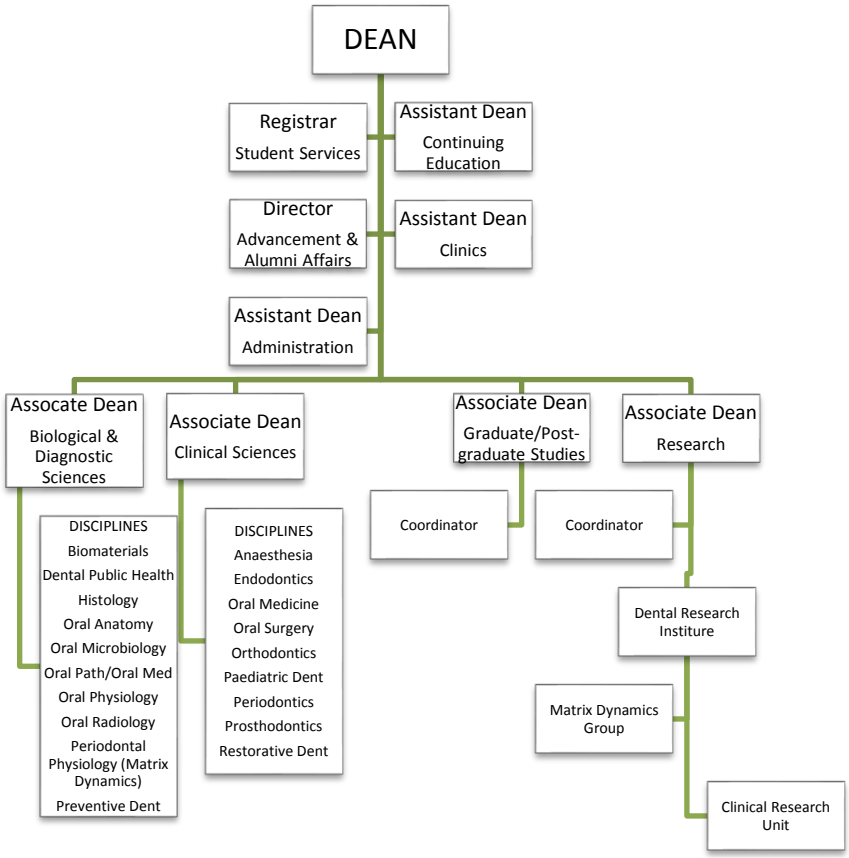
Organizational Structure

Dentistry is a single department Faculty within the University of Toronto. As such, it has representation on Academic Board, in the School of Graduate Studies, and on the Principals and Deans' committee. The academic and administrative leader is the Dean, who reports to the Provost. The Dean of the Faculty is a member of the Council of Health Sciences (and its chair for 2015-2017) as well as a member of the Deans of Single Department Faculties committee.

The 2011 External Review noted that the organizational structure of the Faculty, which had been in place since 1998, needed to be more collaborative and integrated, as there were perceived silos, along with unclear lines of authority, responsibility and accountability.

From 1998 to June 30, 2016, the Faculty had the following organizational structure:

Previous Organizational Structure (1998 to June 30, 2016)



A new organizational structure came into effect as of July 1, 2016 and is as follows:

New Organizational Structure (as of July 1, 2016)

The 2014-19 Strategic Plan identified a need for renewal to improve collaboration as well as student, faculty and staff satisfaction. Specifically, under the Direction *Strengthen Our Organizational Capacity and Reach*, Goal 5-3 is *Renew the Faculty Organizational Structure to Optimize Implementation of and Accountability for the Strategic Plan Directions and Goals*. This led to the 2014-15 Priority Action #21: *Develop a plan for organizational structure changes in response to key priorities outlined by the Working Groups and strategic plan; review administrative and committee structures to support organizational changes.* The Working group assigned to reassessing the Faculty's organizational structure followed a consultative approach in 2014-15 through roundtable discussions that identified the need for an improved structure that would facilitate more cross-disciplinary collaboration, clear areas of responsibilities, and improved faculty mentorship, leading to a proposal circulated

in the summer of 2015. Following further consultation, a proposal was sent to the Provost and gained approval in January 2016 for implementation in July 2016.

The new structure aimed to address the issues highlighted in the 2011 External Review as well as the Strategic Plan. Its objective is to result in a structure that better supports our research, education and clinical service missions. It is consistent with our Vision, Mission and Values, as stated in our 2014-2019 Strategic Plan. It also supports the mission of the University of Toronto which is to be *an internationally significant research university, with undergraduate, graduate and professional programs of excellent quality.*

There were two levels of restructuring implemented: academic administration and the current discipline/department structure.

With respect to academic administration, the 4 Associate Dean positions (Biological and Diagnostic Sciences, Clinical Sciences, Graduate and Postgraduate Studies, and Research) were replaced by 2 Vice-Deans (Education and Research), an Associate Dean Undergraduate Education and an Associate Dean Graduate Education. Each Vice-Dean is now responsible to ensure appropriate mentoring and faculty development. The Associate Dean Undergraduate Education is responsible for the D.D.S. and IDAPP curricula. The Associate Dean Graduate Education is responsible for all graduate training, including the specialty programs.

As well, the current 2-department structure of Biological and Diagnostic Sciences and Clinical Sciences was eliminated, along with the 19 disciplines which each had its own discipline head. The 10 specialty programs continue to have program directors, who report to the Associate Dean Graduate Education. The Research enterprise was united without separate divisions.

Being a new structure, as of July 2016, we anticipate a number of challenges as we enter this time of organizational change. The new structure will be assessed yearly, with the understanding that this reorganization is aimed at long-term benefit and thus it may take several years to begin to see the effect of these changes. The purpose of the assessment will be to determine if the objectives of the reorganization are being achieved and if there are recommendations for further revision. The following performance measures will be determined:

- Successful accreditation of D.D.S. program by CDAC
- Our D.D.S. students' success in the NDEB exams
- Our specialty students' success in the National Dental Specialty Exams of the Royal College of Dentists of Canada
- Improvement in outcomes at the next Speaking Up Survey
- Improvement in outcomes in Course Evaluations and Exit Surveys of our students
- Mentoring program in place for faculty
- Number of peer reviewed papers published per year by our faculty
- Number of new collaborations on abstracts, papers, grant applications
- Number of grants submitted per year
- Number of grants funded per year
- Number of faculty members with external funding
- Total amount of grant funds awarded to faculty members

Financial Structure

In May 2013, the Planning and Budget Office provided us data showing that the 5-year projection was yearly deficits leading to a projected accumulated deficit in 2017-18 of $19.7M. Faced with these serious financial challenges, the Faculty took on a number of initiatives: (1) in early 2013, an opportunity was presented to us to expand the clinical and teaching space and the acquisition of this additional space enabled us to increase D.D.S. enrolment over the last few years, with the current 2016-17 year being the final year of growth; (2) reduction in total academic as well as administrative complement; (3) efforts to increase revenue in the various operations, mainly in the clinic operation and Continuing Dental Education programs – revenues have increased from these operations over the last few years; and (4) efforts to reduce costs through a more aggressive procurement process. These changes and efforts enabled us to manage the projected deficits and finally produce a balanced budget in the current 2016-17 year (see Table 6.1). Furthermore, instead of the predicted $19.7M accumulated deficit for 2017-18, we are now projecting an accumulated surplus of $764,000, which is an approximately $20M turnaround.

It is, however, projected that this trend will soon reverse and the Faculty will again face increasing annual deficits as annual average increases for the net budget transfer (approximately 68% of our funding) and the total compensation cost (approximately 78% of our operational cost) are projected to be 1.5% and 4% respectively. The current projection shows that the operational cost will exceed the revenue as early as the 2017-18 year and the gap will widen in the outer years (see Tables 6.1, 6.2 and 6.3). Tuition fees have increased approximately 3% to 5% yearly for each of the past 5 years, and we are assuming the same rate of increase for the near future.

Table 6.1: Operating Budget (in millions $)

	2013-14 (actual)	2014-15 (actual)	2015-16 (actual)	2016-17 (actual)	2017-18 (project)	2018-19 (project)	2019-20 (project)
Net budget transfer *	23.2	26.8	28.2	29.2	29.4	29.7	30.2
Clinic revenue	6.5	6.7	6.8	6.9	7.1	7.3	7.5
Division revenue **	5.7	6.5	6.8	7.1	7.3	7.4	7.5
Net budget ***	35.4	40.0	41.8	43.2	43.8	44.4	45.2
Compensation cost ***	21.3	21.5	21.2	21.5	22.4	23.3	24.2
Clinic cost	13.4	14.2	14.7	14.9	15.2	15.5	15.8
Student support	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Other cost	3.7	5.0	6.1	6.5	6.5	6.5	6.5
Total operation cost	38.7	41.0	42.3	43.2	44.4	45.6	46.8
Net operation deficit	(3.3)	(1.0)	(0.5)	0	(0.6)	(1.2)	(1.6)

**Net budget transfer* represents a flow-through amount from the University based on the total gross revenue (revenue from tuition fees, provincial grants, investment income, research overhead etc.) less the university cost (University Wide Cost, University Fund contribution, University Fund allocation, Student Aid Set-Aside etc.).*
***Division revenue includes revenues from CDE programs, IDAPP, student ancillary fees such as instrument fees etc.*
**** Net budget is funds available for the operation - a total of net budget transfer, clinic revenue and division revenue.*

***** **Compensation cost** represents salaries, wages and benefits for all appointed as well as non-appointed staff excluding the salaries, wages and benefits of the clinic support/administrative staff and part-time instructors (these costs are included in the clinic cost below the line)*

Table 6.2: Operating Budget

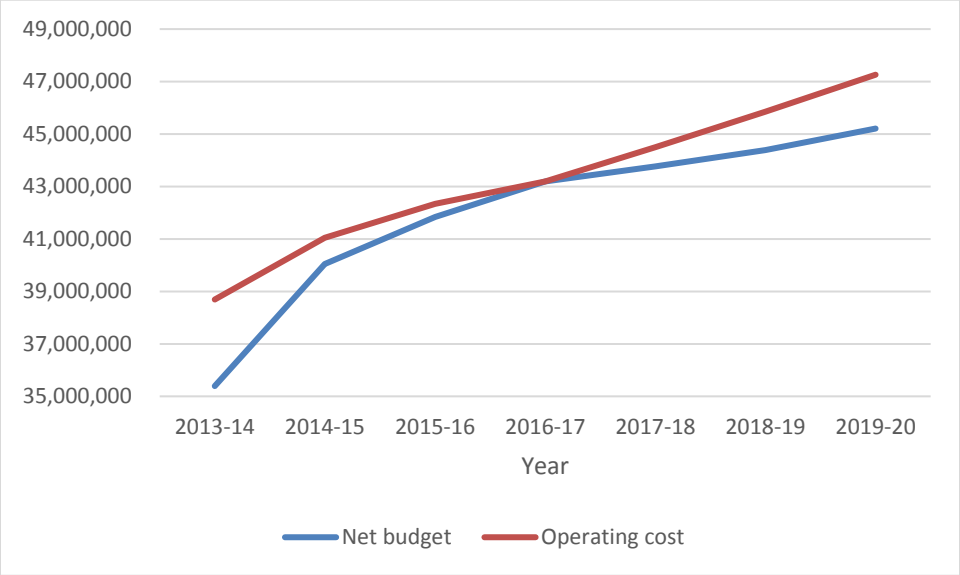
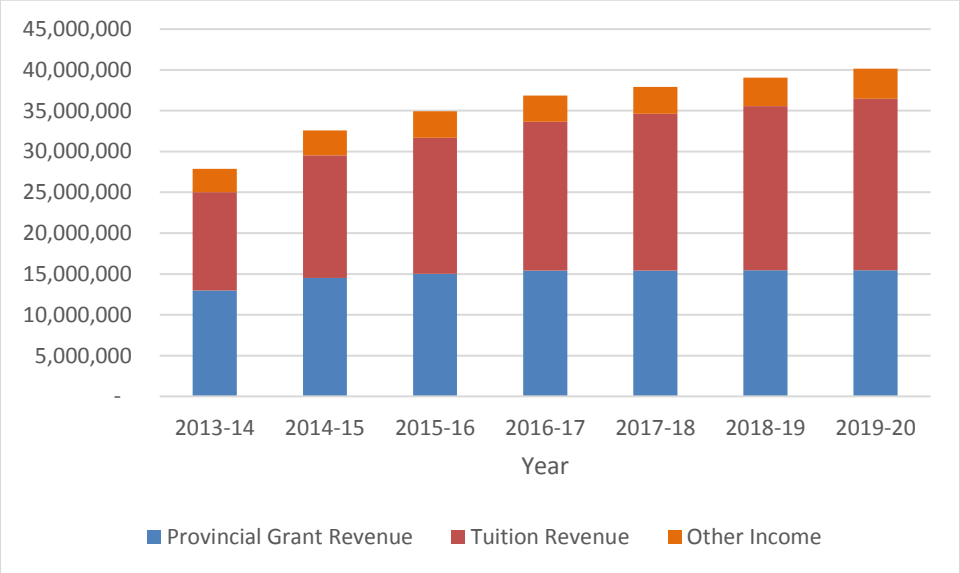


Table 6.3: Gross Revenue



Despite the projected base budget deficits for the last few years, the Faculty has been able to manage its finances without actually resulting in a deficit during any of these years. In 2013-14, the Faculty was able to recover the projected deficit with a one-time-only support from the Provost and utilizing the accumulated reserve that had been carried forward from

the previous years. In 2014-15 and 2015-16, with the substantial increase in the net budget transfer from the University, primarily due to the increase in D.D.S. enrolment as well as other cost saving measures described earlier, the Faculty was able to end each year with some savings.

These savings have been added to the operating reserve over the years. In 2016-17, the Faculty allocated $3M of the reserve to the capital project, "Dentistry Wet Lab Consolidation and Revitalization" (see the Research Infrastructure section for details of the project). The financing of the project has not been finalized at this point. However, the project will be funded by 3 major sources – new federal Post-secondary Strategic Infrastructure Fund, funds from the University Facilities Renewal Program and contribution by the Faculty. The Faculty's portion will be a combination of $3M reserve, donations and mortgage. Needless to say, any amount of mortgage will add to the financial pressure to the Faculty's operating fund in future.

Challenges and Opportunities

Challenges are: (1) projected annual deficits as mentioned earlier; (2) added pressure due to the new mortgage required for the completion of the Wet Lab Project; (3) increasing cost to maintain and upgrade the current old and worn-out facilities, especially for the clinics; (4) renewal of the rest of the facilities (after the completion of research infrastructure project); (5) ever increasing cost for clinic operations, some of which are due to external factors such as new regulations and standards for health and safety, infection control, keeping up with technology changes, U.S. and Canadian currency differences as many clinic supplies and pieces of equipment are purchased from U.S. manufacturers, etc.; and (6) whether or not the Faculty can keep the same level of faculty and staff complement (which is the current long-term plan) and continue to provide/produce excellent education and research.

Opportunities are: (1) potential for operational efficiencies with the new Faculty restructuring and continuing enhancement/automation of various operational areas; (2) with the leadership change in the Advancement Unit and creation of the Communications Officer, potential for improved/enhanced Faculty profile and alumni relations which can lead to increased level of annual donation and major gifts; (3) with the renewal of the infrastructure and new direction/focus, potential increase in grants and external research funding which will in turn result in an increase in research overhead to support the operation; (4) potential net compensation recovery as senior faculty members retire and the positions are replaced with junior faculty members; (5) potential for new and/or increased funding for clinical education and operation as we continue discussions with the provincial government; and (6) continuing efforts to reduce various operational costs, e.g. reduced utilities cost as facilities are upgraded to the new and improved building sustainability standards.

Advancement

An Office of Advancement was officially established at the Faculty in 2009 with the hiring of the Faculty's first Director of Advancement. Since that time, protocols, procedures and rigour focused on prospect and donor activities have been applied to a good degree of success.

The Office of Advancement was established in the midst of the quiet phase of The Boundless Campaign. "Boundless" is the largest fundraising campaign in Canadian university history. With a historic $2-billion goal, the campaign is expanding U of T's global leadership capacity across critical areas of knowledge and helping develop the talent, ideas and solutions for the defining challenges of our time. Thousands of alumni and friends are supporting the campaign's critical priorities. The impact of this giving is lifting every aspect of the University.

The Faculty of Dentistry Advancement Office has contributed and continues to contribute to the University of Toronto's Boundless Campaign. The Faculty currently has a campaign goal of $18M to which is it has raised, at the time of writing, $15,112,109 focused on various priorities at the Faculty including student support, Access to Care, clinical service, research and learning.

To ensure future sustainable success not only for the Boundless Campaign, but beyond, the Office of Advancement and Alumni Affairs at the Faculty of Dentistry is repositioning itself.

A new Director of Advancement began in July 2016 after the previous Director of Advancement left the Faculty in January 2016. The new Director is working to understand the Faculty and its priorities as they relate to the Advancement Office as well as the resources currently deployed to help build fundraising and alumni programming.

The office structure currently employs a staff complement of 3 full time employees and 1 part-time casual employee.

The Director of Advancement, is a member of the senior leadership team at the Faculty who creates and oversees the strategic direction of the advancement and alumni activities. She provides leadership to set office priorities and programming, manages 3 staff and other internal and external relationships that include alumni relations, sponsorship, corporate and other stakeholder relations with a focus on creating solid major gift programming. These include the Manager of Alumni Relations, the Development and Alumni Relations Coordinator, and a part-time Administrative Assistant.

The description of our involvement in Alumni Affairs is described in the section on Internal and External Relationships.

The part-time Administrative Assistant, supports all people on the team by executing various tasks related to the business in the office such as receiving RSVP's for events, managing mailing lists, creating mail merges, helping to reconcile expenses, keeping the office stocked with materials and equipment running effectively. This role needs to move to a full-time position that can bring strong Arbor, Excel, Word and financial skills as well as stewardship support among other things. This will help to lessen the burden currently

shouldered by the Director, Manager and Coordinator and will support the reduction of overtime.

A possible future step that would support more fundraising and richer alumni relations impact may be to divest the Advancement Office of certain student events and activities that could potentially realign under the Office of Student Life. Any events that the alumni base is not invited to or where the Alumni Association has not been involved, could be shifted to the Office of Student Life provided they had the appropriate support staff to effectively allow for such a move.

Exactly what future activities must take place are not entirely clear to the Director given she has only been active in her role for a short time. It is anticipated that the Office must acquire more administrative support, reposition staff portfolios, adjudicate current stewardship, event and student activities/portfolios and most importantly, fundraise through a variety of channels, but with a focus on major gifts and leadership annual giving (LAG).

Should things align and the Office begin to work more effectively, there is great optimism that over the next year or two a sustainable base of support is achievable. Positive advancement performance has the capacity to significantly bolster the activities taking place at the Faculty, but currently the office structure needs revamping and additional resources to achieve such targets.

7. RESOURCES & INFRASTRUCTURE

Overview

The Faculty of Dentistry is housed primarily at its site at 124 Edward St. We currently also have laboratories, clinics, classrooms, and faculty offices located at 481 University Ave., and the Fitzgerald Building on main campus. Three of our faculty members (all cross-appointed with IBBME) have laboratories in the MaRS-2 complex and the Mining Building. The Faculty of Dentistry building was constructed in 1959 with an addition completed in 1985. It is 14,000 net assignable square metres (NASM) in size (equivalent to approximately 150,000 square feet). It holds 88 research laboratories and support spaces, 24 classrooms and lecture halls, 12 clinics, 158 faculty and administrative offices, student activity space, and a library. The Research labs and support space comprise 2,626 NASM (approximately 28,000 square feet). Clinics and clinic support space comprise 5,209 NASM (approximately 56,000 square feet). Classroom space is 2,480 NASM (approximately 26,000 square feet).

The Faculty of Dentistry also currently occupies the second floor of the Fitzgerald Building, located at 150 College St., on main campus. It is comprised of 900 NASM, which consists of research labs and support space, as well as faculty and administrative offices.

In 2014, the Faculty of Dentistry leased space on the fourth floor at 481 University Ave (shared entrance on 137 Edward St, in close proximity to the main building at 124 Edward St). It consists of 950 NASM, comprised of classrooms, clinics holding 24 dental chairs in a main clinic, 6 additional dental chairs, a pre-clinical laboratory, and administrative offices. It is leased until June 2019. The offices of Continuing Dental Education are housed at this site. The addition of this clinical space was aimed at facilitating the enrolment increase in the D.D.S. program.

Laboratory Facilities

The current laboratories that house the Faculty of Dentistry research units are located for the most part in the Dentistry building, located at 124 Edward Street, south of the main campus. The Dentistry building was constructed in 1959 and a new wing was added to the north side of the building in 1985. Research labs for the Matrix Dynamics Group are housed on the second floor of the Fitzgerald building, which was constructed in 1927. The physical infrastructure of both Dentistry and Fitzgerald buildings has aged and is in poor condition and poses significant challenges. The individual labs are small making them crowded and cluttered and are unable to accommodate state-of-the-art research equipment and personnel. Safety equipment throughout the building and required for wet lab research does not meet many of the Canadian Biosafety Standards. In addition, the current accommodations are a “rabbits-warren” of tiny interconnected labs, providing inadequate space to meet the increasing need for additional equipment, research, student, and incubation space.

Given this reality, the Faculty of Dentistry proposed to renovate 2 floors in the Dentistry building to create modern, sound and flexible infrastructure to support the Faculty of Dentistry’s innovative research groups, to enhance training of future highly qualified personnel and to realize the Faculty of Dentistry’s mission. The proactive work in preparing this study positioned the Faculty so that it was ready and able to be part of the

University of Toronto's application to the Federal Government's post-secondary Institutions Strategic Investment Fund (SIF) that arose in the spring of 2016. This application requested support for a $30,000,000 project for research infrastructure revitalization. In late July 2016 the federal and provincial governments agreed to provide support to the University of Toronto, of which our plan was one component. This grant will provide over $11,000,000 in funds towards this project.

The Wet Lab Consolidation and Revitalization project will involve a major renovation of approximately 3800 NASM (38,000 sq. feet) of existing laboratory and office space, as well as washrooms and corridors on the 4th & 5th floors of the Dentistry building, creating large open-plan labs that will substantially enhance the Faculty's discovery, training and innovation capacity. Integration of formal corridors into ghost corridors, and creating shared support rooms rather than dedicated will allow the Faculty to maximize the available space to meet our current needs and accommodate future growth.

Table 7.1: Existing Dentistry Wet Lab Space

Building	No. of labs and support rooms	No. of PIs	NASM	Avg. room size (nasm)
124 Edward St	74	14	1480	20
Fitzgerald Building	21	5	731	35
Total	95	19	2211	23

Table 7.2: Proposed Dentistry Wet Lab Space

Building	No. of labs and support rooms	No. of PIs	NASM	Avg. room size (nasm)
124 Edward St.	21	21	2229	106

This revitalization project will also allow the Faculty of Dentistry to integrate the Matrix Dynamics Group back to the Faculty of Dentistry building. Features of the revitalized research labs include:

- Addition of technology and safety enhancements to all research labs and support rooms
- Large open-plan labs with shared support rooms to maximize space
- Consolidation of all Faculty of Dentistry research labs under one roof, and adjacent to the Public Clinics to promote integrated clinical research
- Upgrade of electrical and mechanical systems to enhance function and sustainability
- Removal of all remaining asbestos
- Creation of dedicated student office and support spaces
- Clear delineation between public clinic areas and secured research labs
- Conversion of existing air handling systems to more energy efficient and sustainable units

- Reduction in the number of fume hoods, and utilizing new, energy efficient hoods in their place
- Improved environmental sustainability, including replacing single-pane windows with energy efficient units, occupancy sensors in labs and offices, and energy efficient light fixtures

The consolidation and revitalization of these research labs will address basic infrastructure improvements such as air handling, climate, and electrical systems, which are currently overloaded and inefficient. The revitalized research labs will also provide improved research grade laboratories with equipment and support rooms that will be used jointly by researchers, post-doctoral fellows, graduate students and faculty. The new labs will be designed to support collaboration, flexibility of lab space allocation, and will support integrated clinical and basic science research platforms and more incubation space. In addition, the use of an open concept design will encourage the Faculty's research teams to work within the same visual and auditory space, offering the ability for pro-active interaction and support, open discussion and cooperation and "osmotic communication".

The revitalized space includes significant improvements to:

- Laboratory space for faculty, graduate students, and post-doctoral researchers
- Laboratory space for the Matrix Dynamics Group
- Increased collaboration and student engagement spaces

The proposed renovations can begin as early as January 2017 as detailed space programs and preliminary engineering work are already underway.

Table 7.3: Research Revitalization Project Timeline

Milestone	Anticipated Date
Documents to UPD for approval for Consultants	May 2016
Approvals - Governance	October 2016
Architectural/Engineering Plans approved	December 1, 2016
Construction start date	January 31, 2017
Proposed Completion date	April 30, 2018

8. ACADEMIC SERVICES

Overview

All University of Toronto students have access to a wide range of services and educational opportunities in addition to their formal programs of study. These services include access to comprehensive physical and mental health care on campus, such as specialized counselling and treatment options, career and employment services, and opportunities for participation in campus life. Full details of these student services can be found in Appendix 14. With that being said, our D.D.S. and graduate programs are intensive, and many of our students are challenged by limitations to their time.

The Health Sciences Writing Centre (HSWC) provides support to Dentistry students with any form of writing, including course assignments, research presentations and resumes. The focus of the one-on-one sessions that students may book with an experienced writing instructor is on developing critical thinking and writing skills.

The Office of Advancement currently hosts several mentorship events to help prepare our students prepare for life after graduation. There is an annual *Mentorship Lecture* given by recent alumni discussing alternate career paths to urban dentistry, as well as an annual *Young Alumni Mentoring Students* event connecting recent alumni of varying career paths to share their "life after graduation" experiences and advice with our students to guide them through the next phase of their dental career. We offer *Open Practice Nights* with established alumni, where students can tour offices and seek advice. A newer addition to our mentorship offering is the *Word of Mouth* networking event specifically for the DDS IV class linking UofT alumni and clinical instructors who are able to facilitate job placements, whether they have a practice with upcoming associateship openings or are able to connect students with those who do, while offering helpful tips and advice.

We have also redesignated spaces at the Faculty for student activities. Our former cafeteria was renamed the Student Commons, and we are retrofitting a number of our student lounge spaces to better encourage student meetings and discussions.

The Faculty has supported extracurricular activities for students and their engagement has increased in the last few years. Students at our Faculty are involved in a number of community outreach and leadership activities. Initiatives include mentorship programs such as Big Sibling, Peer Mentorship, and Clinical Mentorship programs in prosthodontics and restorative dentistry. Students also participate in interprofessional seminars and workshops with other healthcare faculties where they develop skills in collaboration, teambuilding, and communication. Orientation week is organized by second-year students who plan academic and social events to aid the new incoming class in their transition to our school. Involvement in Orientation week spans all 4 years of undergraduate students, as well as faculty and staff. This program is reinstated every January to welcome our incoming international dentists joining the Faculty.

Our student government has vast and enthusiastic involvement and has organized fundraising events such as marathons, hockey tournaments, candy sales, and food drives; the proceeds of which are donated to local charities. There have also been enriching Lunch & Learn events with guest speakers on topics including "mental health and dentistry" and "Africa Talks". These seminars are highly attended by both students and staff and foster a cooperative environment for learning and discussion. The wellness committee was

established recently to improve the well-being of students and staff at the school. Their events include yoga classes, massage therapy, meditation and mindfulness, and colour therapy.

Our students are also very focused on providing accessible dental education, and community engagement extends beyond our school walls. Sharing Smiles Day is an event to introduce people with special needs as well as their caretakers to the basics of oral health, home care, and hygiene. Brushamania and Junior Smiles are programs where children in the community are given instruction on oral care, healthy diet, and smoking prevention in an effort to emphasize the importance of preventive practices. The dedication and commitment of our students to develop new initiatives speaks to the quality and character of the candidates we select.

Registrar and Student Services

Within the Faculty of Dentistry, the Registrar's Office is dedicated to providing support for Dentistry students, and serves as the first point of contact for students seeking advice on academic and financial matters. Within the Student Services Office students can request information related to a number of activities, including: undergraduate and graduate admission; electives and exchanges; student record collection; scholarships and financial assistance; personal advice and counselling; tuition fee enquiries; confirmation of enrolment letters; scheduling of courses, clinics, term tests and final examinations; and registration.

The Director of Student Life is an advocate for all students and engages them by listening to and discussing their successes, concerns and struggles in academic, clinical and personal matters. The Director acts as a facilitator for students, helping develop a sense of professionalism, responsibility and ethics as students prepare to become members of our profession. He is dedicated to maintaining rewarding and positive links with all facets of our Faculty, and is committed to supporting all students individually and collectively to maintain the best possible student experience.

Since 2012, the Faculty has had an imbedded Wellness Counsellor from Health and Wellness at UofT, as a service for all undergraduate and graduate students. This provides an opportunity for confidential counselling for them in a completely anonymous manner.

Library Services

U of T's Dentistry Library is Canada's largest academic dentistry library. It is part of University of Toronto Libraries, which is ranked third among peer institutions in North America, after Harvard and Yale. The Library is staffed by two professional librarians with Master's Degrees, one library technician, and 5 to 7 part-time student employees.

Facilities and study space

The Library is located on the second floor of the Faculty of Dentistry building, occupying 700 NASM. It has 12 closed study carrels, a group study room, and a large reading room with 95 seats. There is a computing facility consisting of 13 networked PCs and two laser

printers, contained in two rooms in the Library. One of the rooms has a projector, for instruction in library research or software training.

During the academic year, from Monday to Thursday, the library is open 12 hours from 8:30 am to 8:30 pm. On Friday, the library is open from 8:30 am to 6:00 pm.

When the Dentistry Library is closed, the students can use other University of Toronto libraries such as Robarts Library or Gerstein Library which are open much longer hours per week, including both weekend days.

Collections

The Library's website (https://dentistry.library.utoronto.ca/) provides a gateway to all the library collections and services including links to e-journals and a list of recent acquisitions.

The Library maintains comprehensive book approval plans with 53 book dealers and vendors worldwide. These plans ensure that the Library receives academic monographs from publishers all over the world in an efficient manner. For Dentistry, our acquisition process ensures that we hold all university-level dentistry books from major publishers as well as many other important oral health sciences books and selected association publications. The largest part of dentistry related collections is located in Dentistry Library, with additional resources housed in the Gerstein Science Information Centre. Collections are purchased in all formats to meet the variety of preferences and styles of current students and faculty.

All U of T dental students, faculty, and staff have access to the electronic resources both on and off campus.

Help and Support

Faculty of Dentistry members can get help about using library resources and services with the expertise and assistance of the Dentistry Library staff in many different ways: in person, by phone or via e-mail. They can also follow us on Twitter, watch us on YouTube, read us in our Blog and ask us questions through the Library Instant Messenger service.

Especially, the Library plays an important role in the linking of teaching and research in the Faculty of Dentistry.

For instruction, in addition to offer instruction workshops about specific resources to our users, the Dentistry Library facilitates formal instruction integrated into the class schedule and hands on tutorials related to course assignments. These services are aligned with *Competency 4 – practice and information management* of the ACFD educational framework for the development of competency in dental programs (see Appendix 6).

For research, the library staff helps our researchers in their different research stage: research consultations, research conducting, Open Access Publishing supporting and research evaluation and promotion etc.

In order make it easy for our users to get information and learn research skills based on their availability ---not by the library hours, 12 research guides have been developed to serve as a portal to selected resources for different research topics, such as: Evidence-based dental practice, Clinical Decision-making Resources for Dentistry, Dental and Oral

Health Statistics and Data, Dentistry Mobile Apps, and Employment for dentistry students etc.

Preservation, Digitization, and Open Access

The University of Toronto Libraries supports open access to scholarly communication through its institutional research repository (known as T-Space), its open journal and open conference services, and subscriptions to open access publications. In addition to acquiring materials in support of Dentistry program, the Library, in cooperation with the Internet Archive, has digitized its monograph holdings published before 1923.

A full Library Services report can be found in Appendix 15.

9. INTERNAL AND EXTERNAL PARTNERSHIPS

Overview

The Faculty of Dentistry is engaged in relationships internally through interactions with cognate divisions and university-affiliated institutions. It is engaged externally through its relationships with professional organizations provincially, nationally, and internationally. It provides an important service for the dental community through its Continuing Dental Education programs. It connects with many of our nearly 8,000 alumni through our Advancement and Alumni Affairs office. It offers training to permit licensure in Canada for international dentists and dental specialists through its International Dentist Advanced Placement Program (IDAPP) and its Dental Specialty Assessment and Training Program (DSATP).

Relationships within the University of Toronto

The Faculty of Dentistry is one of 7 Health Science Faculties at the University of Toronto and, as such, is part of the Council of Health Sciences (CHS). As stated in its Terms of Reference, the CHS "*represents the University of Toronto health science sector and facilitates collaboration and enhancement of health science research and education endeavours. All health professional disciplines and schools are represented on the Council. Through the CHS Chair, the CHS reports directly to the Provost."* For 2015 to 2017, the Dean of Dentistry is its Chair, following his 2 years of service as Vice-Chair. As part of this role, the Faculty is committed to active involvement in Interprofessional Education. Its Dean is currently co-chair of the Centre for Interprofessional Education governance committee, through his role as Chair of CHS.

The Faculty also has relationships with a number of the University of Toronto affiliated teaching hospitals (part of the Toronto Academic Health Sciences Network (TAHSN)). Specifically, The Hospital for Sick Children, Mt. Sinai Hospital, Sunnybrook Health Sciences Centre, Princess Margaret Hospital, Holland Bloorview Kids Rehabilitation Hospital and Weeneebayko General Hospital (Moose Factory) have our students take part in clinical rotations at their sites.

The Faculty of Dentistry is part of 2 Extra-Departmental Units (EDU). We are the lead Faculty in the University of Toronto Centre for the Study of Pain (UTCSP), collaborating with Faculties of Pharmacy, Nursing, and Medicine. We are also one of 3 partners, along with the Faculty of Applied Science and Engineering and the Faculty of Medicine, of the University of Toronto's Institute of Biomaterials and Biomedical Engineering (IBBME).

Relationships with Professional Organizations

The Faculty of Dentistry has strong relationships with professional organizations. Faculty members play key roles with groups that include the Association of Canadian Faculties of Dentistry, the Royal College of Dental Surgeons of Ontario, the National Dental Examining Board of Canada, the Royal College of Dentists of Canada, and the Ontario Dental Association, among others. It is an affiliate member of the American Dental Education Association. Our faculty members have also played major roles in research organizations such as the International Association of Dental Research (2 of its past-presidents and a

number of research section presidents have been from our Faculty) and the International Association for the Study of Pain (a past president is from our Faculty).

Continuing Dental Education

As a professional Faculty, the Faculty of Dentistry has always considered the provision of quality continuing dental education (CDE) for the profession as part of its mandate. Up until 2009, continuing dental education, alumni affairs and advancement were under the direction of one Assistant Dean with a staff of 4.25 FTE. In 2009, a professional Director of Advancement was recruited and the functions were separated into Continuing Dental Education and Professional Relations, under the direction of the Assistant Dean, Continuing Education, and Advancement and Alumni Relations under the direction of the Director of Advancement, with staff complements of 3.25 and 3 respectively. CDE must operate on a cost recovery basis with no financial support from the University. Ideally it should generate revenue for the Faculty. Separating CDE has proven to be a wise decision. Over the last 5 years the single focus has resulted in a 300% expansion of the quantity and variety of CDE courses. Staff has been able to devote the necessary time to ensure that this expansion maintained its cost recovery mandate while at the same time assisting the Faculty to meet its budget requirements without resorting to increasing student tuition. This expansion has also resulted in an increase in the contributions made to individual disciplines. Important also is the need for the Faculty to provide CDE courses for commercially difficult but important topics that other providers would not or could not. CDE has been able to develop revenue sources, most notably via online education, to allow financial support to those courses so that this important service to the profession could continue.

CDE courses are offered in a variety of formats. A typical annual offering for standard CDE courses for the 2015/2016 academic year is as follows:

Month	Course Title
September	Clinical Pharmacology & Neuropsychiatric Disorders
October	Practical Periodontics
	Small Field of View Cone Beam CT
	Dental Caries Update (London, ON)
	Paediatric Dentistry
November	Creating Endodontic Excellence
	Medical Emergencies
	Nitrous Oxide & Oral Sedation
	Restorative Dentistry
	Avoid Liability: Know your patients' medications
December	Clinical Local Anaesthesia & Emergency Medicine
January	The Cancer Patient: Issues in Safe Dental Management
	Small Field of View Cone Beam CT: Principles & Applications
	CPR Recertification
	Porcelain Veneers from A - Z (Repeat on Saturday)
February	Radiology & Oral Pathology Core 1 Course
April	Treatment of the Anterior Fractured Tooth

	Composites
	Medical Emergencies
	Nitrous Oxide & Oral Sedation
	Posterior Composites
	Infection Control for Dental Offices
May	Oral Surgery for the General Dentist
	Management of Peri-Implantitis
	Advanced Techniques for Socket Preservation and ridge Augmentation
June	IV Moderate Sedation

In addition to these standard courses, CDE offers a number of other programs in different formats as follows:

- A comprehensive one year full time biomaterials/implant course for graduate dentists. While this program is designed to provide foreign dentists with the opportunity to enhance their skills in implant dentistry and return to their country to make these skills available, Ontario dentists can and have taken this course. The course is strictly a CDE program and does not confer any special academic standing to those who complete it. Enrolment for this course is limited to 4 students.

- An implant residency for practicing dentists that operates 2 or 3 days per month from January to December except for July and August. This course is designed to provide basic training in implant dentistry including the opportunity to treat patients in both the surgical and prosthodontic aspect of implant dentistry. Enrolment in this course is limited to 24 students.

- A cosmetic dentistry residency for practicing dentists that operates 2 or 3 days a month from September to June. Dentists in this program receive training including lab and patient treatment sessions in a variety of cosmetic dentistry procedures. Enrolment for this course is limited to 24 students.

- A comprehensive practice management course operating 2 Saturdays a month from September to April. Enrolment for this course is limited to 60 students who can be dentists or office managers of dental offices.

- Two Vacation and Learn opportunities; one is a cruise in February for adults only and the other is during March break at a family destination such as the Disney Cruise.

- A comprehensive on-line continuing education option via utooth.ca [University of Toronto Online Oral health Teaching Hub]. This site is specifically designed to assist members of the dental profession of Ontario to meet the Category 1 [CORE] regulatory requirements for CDE. Approximately 35% of the dental profession has used utooth.ca to obtain the necessary CDE credits in the CORE category. Not only has this service been a great help to the profession and the Faculty's alumni, it also has been a financially rewarding program for the Faculty that has allowed investment in the growth and scope of the overall CDE program.

- Remedial courses are also offered through this department. Clinicians whose knowledge or skills have been found wanting by the Royal College of Dental Surgeons of Ontario are referred to the Faculty. Generally, these require individualized programs varying from one to a number of days. During a typical academic year the Faculty would provide approximately 60 of these courses.

Sessional faculty members can attend many of their programs at reduced rates and also have complete access to Utooth.ca at no cost, adding an additional incentive for clinical instructors to offer their services to the Faculty as well as maintain their clinical knowledge and skills.

The Faculty offers most of the standard continuing education courses at its offsite facility in the north end of Toronto. This provides a comfortable venue with state of the art media equipment and the capability for hands-on simulation. As well, there are arrangements for nearby hotel accommodation and reasonable food services. The Biomaterials course is given in the Faculty and associated hospitals and the Continuing Dental Education residencies for practicing dentists are primarily offered at the 481 University site.

Alumni Affairs

Alumni Affairs falls under the direction of Director of Advancement, who oversees a 3-person team. The Manager of Alumni Relations, contributes to the strategic direction of the Faculty's Alumni Relations portfolio. She spends much of her time planning and executing events, cultivating sponsorship relationships and the sponsorship program to support alumni and student initiatives. There is much time spent on administrative tasks such as reconciling student expenses, taking RSVP's and reconciling "Imodule" funds and managing student activities among other things. This position requires reevaluation over the coming months to determine how to best spend our time and resources on a go forward basis as the current structure of events is bogging down performance and is contributing to unsustainable levels of overtime.

The Development and Alumni Relations Coordinator, contributes to the event programming by helping with some execution mainly focused on class giving and reunions. She contributes to the strategic planning for the annual and leadership annual giving campaigns and is in touch with donors. As well, she is the main contact for our stewardship activities in the office. This position also has too large a component of administrative tasks such as student expense reconciliation, student activities and accepting RSVPs for events. This role needs to be reevaluated over the next several months to half year to determine the optimal portfolio composition and clarify the expertise level required to be successful reaching fundraising targets. This position is also generating an unsustainable level of overtime that needs to be addressed.

There is great capacity to deepen the engagement with the Faculty's alumni and increase fundraising revenues through strategic, thoughtful programming, communication and development activities.

An example of a positive step toward engaging the Faculty's alumni was the creation of the Communications Office and the Dentistry magazine now falling under the strategic

direction of the Communications Office rather than Advancement. This move of responsibilities was beneficial for several reasons including freeing up time to do more major gift work for the Director versus trying to pull data for mailing lists or derive content for example. Additionally, the quality of the content and the professionalization of the look of the publication has increased the engagement of the Faculty's alumni. Additionally, the messaging and look being crafted by a communication specialist exceeds the more narrow view and inferior image that was formerly being shared. Beyond content, there is now a more thoughtful process for sharing the magazine with stakeholders beyond alumni to include, friends, donors, university stakeholders and other community partners.

International Dentist Advanced Placement Program (IDAPP)

The International Dentist Advanced Placement Program is a special university program held over 6 months. After successful completion of this program students are fully integrated into the third year of our 4 year D.D.S. program, leading to a degree. The program is intended for graduates of non-accredited dental programs, i.e. educational programs that have not been recognized by the Commission on Dental Accreditation of Canada (CDAC) or the American Dental Association Commission on Dental Accreditation (CODA). Upon successful completion of the IDAPP, the third year and fourth year of the D.D.S. program and the National Dental Examining Board of Canada (NDEB) examinations, the candidate will be eligible for licensure/ registration as a dentist in Canada.

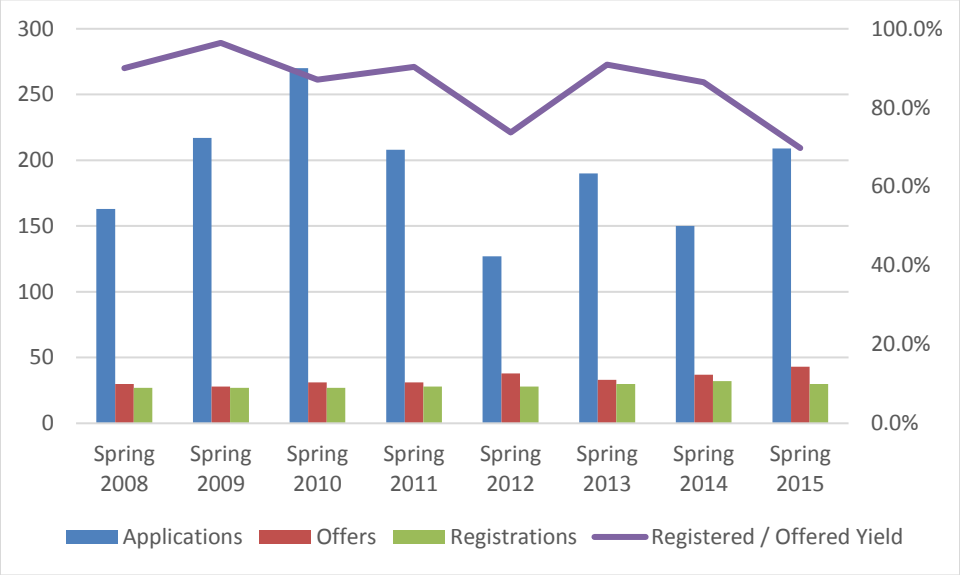
In order to be eligible to apply to the IDAPP, applicants must be graduates of a minimum 4-year University dental program not recognized by CDAC. A minimum current grade point average of 3.0 (4.0 scale) is required. Applicants must be Canadian Citizens or Permanent Residents of Canada on or before the deadline date for applications. All applicants must be proficient in both written and spoken English. Applicants are required to take the Assessment of Fundamental Knowledge Examination administered by the NDEB before the application deadline.

Its current director is Professor Omar El-Mowafy. Admissions data on this program follow.

Since 2011, international dentists wishing to practice in Canada have been given an alternative pathway for licensure, by taking a series of 3 assessments provided by the NDEB which then allows them to take the national board exams. The introduction of this "Equivalency Process" has meant that there is less pressure to seek out degree programs and there was initial concern that it may affect the number of applicants. The table below shows that this did occur in 2012, when there was a drop in applications, but since that time the number of applicants has been rising to approach pre-2011 levels. The IDAPP offers candidates a means to learn the philosophy of dental care in Canada, and contemporary delivery of that care. Furthermore, with a Canadian degree, graduates of these programs may apply to graduate specialty and general practice residency programs in both Canada and the U.S. which may require applicants to have a CDAC or CODA accredited degree. Hence, the degree option remains attractive for many international dentists.

Table 9.1: IDAPP Applications, Registrations, Offers

	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Spring 2014	Spring 2015
Applications	163	217	270	208	127	190	150	209
Offers	30	28	31	31	38	33	37	43
Registrations	27	27	27	28	28	30	32	30
Registered / Offered Yield	90.0%	96.4%	87.1%	90.3%	73.7%	90.9%	86.5%	69.8%



Dental Specialty Assessment and Training Program (DSATP)

The DSATP is a special university program with an initial assessment for a duration of a maximum of 3 months to a maximum of 12 months of training in total. The length of the program will be decided by the specialty program and the needs of the candidate. This program is intended for graduates of non-accredited dental specialty programs, i.e. educational programs that have not been accredited by the Commission on Dental Accreditation of Canada (CDAC) or the American Dental Association Commission on Dental Accreditation (CODA). The program is designed to clinically assess applicants to determine whether they have the knowledge, skill and judgement equivalent to the standards set to graduate a student from a CDAC or CODA accredited dental specialty program. Upon successful completion of the DSATP the student would be eligible to apply to write the National Dental Specialty Examination (NDSE) administered by the Royal College of Dentists of Canada. Upon successful completion of this examination, the candidate would be eligible for licensure by one of the Dental Regulatory Authorities.

The Faculty of Dentistry offers programs for DSATP assessment and training in all specialties when positions are available. It is important to note that spaces are limited by physical facilities. In order to be eligible to apply to the DSATP, applicants must be graduates of a specialty dental program not recognized by CDAC. Applicants must be Canadian Citizens or Permanent Residents of Canada on or before the deadline date for applications. All applicants must be proficient in both written and spoken English. Applicants are required to take the Dental Specialty Core Knowledge Examination administered by National Dental Examining Board of Canada (NDEB) before the application deadline.

Table 9.2: Number and Characteristics of DSATP Applications

	DPH	Endo	Oral Med	Oral Surg	Ortho	Pedo	Prostho	Radiology
2010		1		1	6	2	1	1
2011		3		1	12	3	1	1
2012	1	4	1		7	2	2	
2013		2	1		9	1	2	
2014		3			9	2	3	
2015		2		3	7	2		

Table 9.3: DSATP Acceptances

	DPH	Endo	Oral Med	Oral Surg	Ortho	Pedo	Prostho	Radiology
2010-2015	1	7	2*	2	9	2**		1

** 1 withdrawal*

*** 1 terminated*

10. PREVIOUS REVIEW RECOMMENDATIONS

Overview

The last external review of the Faculty of Dentistry was conducted in October 2011. That report identified strengths and weaknesses of the Faculty of Dentistry and made suggestions regarding ways to address its challenges. Their report identified several key points, which included:

- *"inadequate and outdated facilities space"*
- *"unsustainable budget model"*
- *"need for a Clinical Faculty track"*
- *"the next Dean must develop a clearly articulated vision and strategic plan"*
- Issues with the organizational structure
- *"onsite counselling service for students should be implemented"*
- *"mentoring plan for all faculty in all disciplines should be implemented"*
- *"communications plan must be developed"*

Other sections of this Self-Study have already discussed many of these items. The following summarizes, and in some cases reiterates, specifically how the Faculty addressed the concerns raised in the previous review.

Facilities

The reviewers pointed out issues regarding our infrastructure and referred to the plans for a new building, stating that "*The Dentistry building, while dated, could be repurposed . . .*". In 2008 the Faculty of Dentistry had developed a plan for an entirely new building, to be developed at a new site, either closer to, or on, main campus. While the plan had many positive attributes and was approved by University governance to proceed, it was unable to be implemented because of lack of finances. This has now led to a reconsideration of how best to manage our current building's shortcomings. This resulted in 2 significant priorities in the 2015-2016 Strategic Plan Progress Report. Priority Action #5 was to *"Develop a five-year plan to redevelop and reorganize the clinics . . .***".** Priority Action #8 was to *"Develop a long-term vision for improved and increased research infrastructure for the Faculty, including funding and space*." This latter priority was discussed in the section on Resources and Infrastructure. To summarize, a feasibility study was generated to consider conversion of the fourth and fifth floors of the Dentistry building into wet lab space. In January 2016, this proposal was presented to the University of Toronto's Vice-President of Operations, Scott Mabury, and the Vice-President of Research, Vivek Goel. This preparation of this proposal and engagement of central administration set the basis for the plan's incorporation into the University of Toronto's *Lab Innovation for Toronto (LIFT) project.* This project was developed following the announcement by the federal government in its March 2016 budget that $2B was allocated for infrastructure projects in the post-secondary education sector in Canada. University of Toronto prepared an application for a portion of these funds and because of our prior preparation Dentistry was a significant part of this proposal. A plan for a revitalization of our research facilities was developed and proposed to convert 95 existing laboratories, including those built in 1959, to 21 modern laboratories. It will allow a number of our key researchers to relocate from a facility on main campus (the Fitzgerald Building) built in 1927, to these new laboratories. On July 28,

2016, the federal minister for Science and the federal minister for Innovation, along with the Deputy Premier of Ontario, came to the University of Toronto to announce that they will be providing significant funding to our University for this project. Our own Faculty will receive over $11M to be used towards our $30M project.

Budget

The 2011 reviewers noted the problem with the budget situation for the Faculty of Dentistry. Our current budget affairs are addressed in the section on Financial Structure in this report. In fact, the 2011 Self-Study document also noted concerns, and acknowledged that the structural deficit would only worsen in the years to come. In the Annual Budget Review for the Provost in October 2012, the 5-year projection was yearly increasing deficits leading to a projected accumulated reserve after 5 years of nearly $9M. The reality is that the increase in expenses continued to outweigh any increase in revenues.

As such, we took measures to mitigate these differences. We have been able to gain meetings with the Assistant Deputy Ministers from both the Ministry of Health and Long Term Care (MOHLTC) and the Ministry of Training Colleges and Universities (MTCU) to attempt to achieve support. Discussions continue. To date, one positive result is that MTCU recently approved our application for a $150,000 grant to assess means to improve efficiencies in our clinical education program.

We have attempted to reduce expenses where possible by reviewing our operations and cutting our total FTE. The latter is a challenge given the 25% increase in class size, as described below.

We have made efforts to strengthen our revenues.

One significant change we did make was in the enrolment of D.D.S. students. A reassessment of our admission numbers was undertaken in 2013. Up until 2012 the Faculty accepted 64 domestic (Canadian) students into first year. This would often increase by several students who were either international (primarily U.S.) or transferred into second year from another accredited school. In DDS III the class size would potentially increase to as high as 96 once the graduates of the International Dentist Advanced Placement Program (IDAPP) for internationally-trained dentists joined to be fully integrated into the D.D.S. program. The IDAPP (which in 2006 followed the Qualifying Program which was introduced in 1999) class size ranged 20 to 30 students between 1999 and 2014.

In order to allow a change in class size, in 2014 the Faculty leased new space near the school, at 481 University Ave, which has a 24-chair main clinic. This facilitated our ability to have an increased number of students in DDS III and DDS IV. Beginning in 2013 there was a gradual increase in admission of students into first year leading to a DDS I class size of 96 in 2014-15. These students were then joined by 24 IDAPP graduates for DDS III and DDS IV for a class size of 120 in each of those years. This resulted in a 25% increase for graduating classes beginning in 2016-2017, compared to 2013.

The increase in class size was carried out with the knowledge that the perception of many in the community was that there was a surplus of dentists and increasing enrolment would

exacerbate the problem. Yet, the data showed that this perception did not reflect reality. We were able to show that cutting enrolment at UofT does not affect the number of dentists in Ontario, which continues to increase in spite of the previous cuts to enrolment in our school in the 1980's, when the D.D.S. class size was 125. Reciprocity with accredited dental schools in the U.S., Australia, New Zealand and Ireland means that Canadians who do not get into our program can go elsewhere, and return to practice in Ontario. For example, currently there are over 600 Canadian students in U.S. dental schools – approximately 150 per year. As of 2015, the majority of new dentists achieving licensure in Canada have been trained outside of Canada.

We made the decision to improve the accessibility of domestic applicants to get their training here. An increased enrolment in DDS I of 32 students still provides highly qualified applicants, based on the high GPAs of those applying, while allowing them the opportunity to train in Toronto. As shown in the section on Admissions, the average GPA of students registering in our D.D.S. program is 3.9. Furthermore these students should not incur the potentially higher debts that could result from going to certain institutions outside of Canada, where the costs are higher. Our plan should result in more Ontario residents being able to stay in Ontario to get their training to become dentists.

We are committed to a strong IDAPP, which allows internationally-trained dentists to be qualified for practice in Canada, and is the largest of its kind in Canada. Yet, the need may be decreasing somewhat as an alternate pathway to licensure for international graduates was introduced in 2011. Therefore we readjusted the class size to 24.

The increase in tuition and government grant associated with the change in enrolment has been very important for the Faculty. As noted in the section on Financial Structure, it has helped stabilize the Faculty's financial situation for the time being.

Other sources of revenue have increased as well. As discussed in the Financial Structure section, our clinical income has increased gradually, as has our Continuing Dental Education revenue, through the development of new courses and the increasing success of several existing courses. We have undergone a review of, and are making changes to, our Advancement operations, and hope to strengthen donor support in the future.

We will continue to work hard to strengthen our resources and minimize our expenses, and recognize that challenges for the future remain.

Clinical Faculty Appointments

Almost all dental schools have such a track. This takes the form of a non-tenured clinical professorial stream that allows the recruitment of well-qualified academic clinicians to provide clinical teaching and role modeling for students, in both the undergraduate and graduate programs. Unfortunately, the University of Toronto does not have such a stream, other than in the Faculty of Medicine. In the recent past there had been discussion between the university and the University of Toronto Faculty Association regarding introducing this position, which had gone by various names, most recently a "Professor of Practice". This stream would be of benefit to a number of Faculties at the University of Toronto, not just in

the Health Sciences such as Nursing and Pharmacy, but also in Faculties such as Music, and Landscape Architecture and Design. Unfortunately, this stream has not been introduced.

In June 2015, a new stream was approved at the University of Toronto, which was a professorial rank for Teaching Stream. This would allow full-time faculty to become "Assistant Professor, Teaching Stream", with the potential for promotion to "Associate Professor, Teaching Stream", and "Professor, Teaching Stream". These faculty would focus their work on teaching, yet still be involved in scholarly activity. They would differ from tenure-stream faculty in the distribution of time devoted to scholarly activity compared with teaching.

The introduction of this new stream could act to accomplish much of what a clinical track would have achieved. In both cases, the focus is on teaching. In our Faculty's case, it happens to be clinical teaching. Thus we are planning on recruiting faculty into this stream to help strengthen our teaching mission. This effort has recently started. In July 2016, 2 new Assistant Professor, Teaching Stream faculty were appointed – one in prosthodontics and one in periodontology. We hope to continue to progressively increase this cohort in the future.

New Strategic Plan

Shortly after beginning his term in July 2012, the Dean began consulting with several other Deans in cognate divisions to determine approaches for conducting strategic plans. This resulted in the submission of a Request for Proposal to hire a consulting firm to facilitate strategic planning, which was approved in the fall of 2012. In early 2013 a Strategic Planning Committee was formed and guided the process, which included 6 Working groups, 9 focus groups, input from alumni, and a one-day retreat. The final document gained approval by the University in May 2014. The official launch of the 2014-2019 Strategic Plan took place in early November 2014. Yearly priorities have been developed. Progress reports for 2014-15 and another one for 2015-16 have subsequently been published. All 3 documents are posted on our website and included as appendices.

Organizational Structure

This has been described in the section on Organizational Structure. The 2011 External review stated that *"The current organizational structure is large, confusing and overly burdensome"; "Lines of authority, responsibility and accountability are not always clear . . . likely related to organizational structure";* and *"Opportunities for economies of scale appear to exist but are impeded by the "silos" created by the disciplines."* The Report concluded that *"The silo-like environment created by the disciplines impedes potential synergies between disciplines at all levels of teaching, research and service,"* and that the Faculty needs to *"create an organizational structure that is more collaborative and integrated and minimizes the current siloed environment."*

Not only did the 2011 External review identify a need for a reassessment of our organizational structure, but the 2014-2019 Strategic Plan also called for it. Specifically, Goal 5.3 of the Strategic Plan stated:

- Renew the Faculty organizational structure to optimize implementation of and accountability for the strategic plan directions and goals.

Following from this goal, Priority Action Step #21 stated:

- Develop a plan for changes in organizational structure in response to key priorities outlined by the Working Group and Strategic Plan; review administrative and committee structures to support organizational changes.

Following a consultative process, the new structure was approved by the Provost in January 2016, for implementation on July 1, 2016. There were two levels of restructuring implemented: academic administration and the current discipline/department structure. It should be noted that the previous "departments" were not academic units under the University of Toronto policy.

With respect to academic administration, the four Associate Dean positions (Biological and Diagnostic Sciences, Clinical Sciences, Graduate and Postgraduate Studies, and Research) were replaced by two Vice-Deans (Education and Research), an Associate Dean Undergraduate and an Associate Dean Graduate. Each Vice-Dean is now responsible to ensure appropriate mentoring and faculty development. The research enterprise is now unified without separate divisions. The Associate Dean Undergraduate Education is responsible for the D.D.S. and IDAPP curricula. The Associate Dean Graduate Education is responsible for all graduate training, including the specialty programs

As well, the current 2-department structure of Biological and Diagnostic Sciences and Clinical Sciences was eliminated, along with the 19 disciplines which each had its own discipline head. The 10 specialty programs continue to have program directors, who report to the Associate Dean Graduate Education.

Counseling for Students

Beginning in the 2012-2013 academic year, we initiated having an imbedded counselor available for our students. Laurie Coleman, Counsellor and Wellness Coordinator with UofT's Student Life Programs and Services, was available for confidential meetings with any undergraduate or graduate student.

Furthermore, as part of the Strategic Plan, one of the 2014-15 priorities was to appoint a Lead for Student Life to focus on student engagement, well-being, and student life. Following approval of the Strategic Plan in May 2014, one of the first items acted upon was the appointment of a Director of Student Life. Dr. Richard Rayman accepted this appointment, which officially began on July 1, 2014. In this role he is a resource and advocate for the students.

Mentoring for Faculty

As part of the Strategic Plan, one of the first year priorities was to "*design and implement a formal mentorship program for junior faculty, focusing on the first three years to tenure*". A draft mentoring proposal was developed in alignment with current scholarship on best practices for supporting early-career faculty, as well as with consultation with key

stakeholders. The proposal outlined two key stages: pre-engagement (recruitment) and post-engagement (development to tenure). Key facets include appointing a senior faculty member as mentor, to be included from the beginning in the search process, and who will provide guidance to junior faculty in their years to tenure. This includes bi-annual reviews with senior faculty mentors and annual reviews with the dean, focusing on faculty development rather than evaluation. The timelines to tenure provide a step-by-step checklist of objectives and key goals throughout their six years. The Strategic Plan Implementation Committee reviewed the proposal and approved it for implementation as part of the new academic administrators' roles in the new organizational structure. This was done, and mentoring is now also a focus of the 2 Vice-Deans' responsibilities. All new full-time academic faculty are being assigned mentors.

Communications

Not only did the 2011 External Review note this, but our 2014-2019 Strategic Plan indicated the need to undertake a communications audit to determine communication needs, associated resources and recommendations to centralize internal and external communications, as well as assign responsibility for this role.

It was determined that assigning responsibility for this role was best accomplished by creating a position of Communications Officer. This person would have the expertise to undertake the communications audit and needs assessment, as well as centralizing internal and external communications. Thus, in 2014 a job description for a Communications Officer was developed and the position posted, with a subsequent successful search. Erin Vollick began her role as Communications Officer as of January 2015. Ms. Vollick has been very active in improving the communications of the Faculty of Dentistry. Some examples of her work has include taking over as editor-in-chief of the UofT Dentistry magazine, revision of the Faculty's website, initiation of a monthly e-newsletter, and the posting of numerous stories, many of which have been picked up by the media-at-large.

11. FUTURE DIRECTIONS

Overview

The future plans for the Faculty are primarily delineated in our Strategic Plan 2014-19. We are continuing to implement its goals and priority actions. As the plan reaches its final stages, a reassessment of directions for the future should be undertaken. Planning for the process to develop a new academic/strategic plan for 2019 onward should take place during the 2017-18 academic year.

A number of areas for improvement or enhancement have been identified in the previous sections. These are summarized below.

Areas for Improvement or Enhancement

Student Experience

Our Strategic Planning process identified that student experience was not what it should have been. We have been making efforts in this area, which include the creation of a position of Director of Student Life. We must continue to take measures to further improve the experience of our students in both the undergraduate (D.D.S.) and graduate programs. We will continue to seek feedback from our students through such means as our regular meetings of the Staff-Student Relations committee and through their involvement on various other Faculty committees.

Faculty and Staff Experience

The "Speaking Up" survey conducted by the University of Toronto in the fall of 2014 for faculty and staff to help determine their work experience showed that, whereas the faculty fared well overall, there were areas for improvement. The data were helpful to guide us for improvements. Although a number of initiatives have begun with respect to improved communication, collaboration, mentoring of junior faculty, assistance with grant preparation, and efforts to improve collegiality, we will continue to make efforts to improve experience overall. We will carefully assess results from future Speaking Up surveys conducted by the university and incorporate measures in order to optimize the work experience for all.

Research Success

The increasingly competitive nature of grant funding requires the need to improve the quality of our applications. As such, and as described in the section on Research, the Faculty is now initiating a grant review process that will require all faculty to submit their grant applications for review before final submission. We will monitor the success of this new program. Success may also be improved by enhancing our national and international collaborations, as data show that we are lacking in this area.

Academic Programs

The 2014-19 Strategic Plan identified a number of areas for improvement of the learning and teaching environment. The Direction of *"Enriching Our Educational Programs Through Innovation and Scholarship*" had several goals with this intention. Specifically for the D.D.S. program they are:

Goal 1-1: *Design and implement curriculum renewal*

Goal 1-2: *Strengthen teaching across all programs*

Goal 1-3: *Establish new educational program options*

Goal 1-4: *Foster the teaching of social responsibility through community outreach*

Each of these goals developed their own specific priorities. In the first year of the plan (2014-15), the following were priorities related to enhancing the quality of the D.D.S. program:

Priority Action #1: *Create a plan for a renewed undergraduate curriculum to streamline and improve coherence, creating core curriculum and electives.*

Priority Action #2: *Assess needs regarding teaching quality and develop programs to outline and implement interventions.*

Priority Action #3: *Initiate outreach opportunities in community settings that serve populations in need.*

In the second year of the plan (2015-16), the following were priorities related to enhancing the quality of the D.D.S. program:

Priority Action #1: *Design and implement DDS curriculum renewal, including exploring the feasibility of added electives and core curriculum*

Priority Action # 2: *Renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment*

Priority Action # 3*: Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*

For the third year of the plan (2016-17), the following are priorities related to enhancing the quality of the D.D.S. program that are being pursued:

Priority Action #1: *Renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment*.

Priority Action #2: *Develop a formal program to strengthen teaching quality across undergraduate and graduate programs*.

Priority Action #3: *Determine feasibility of introducing a model to better integrate basic science into clinical training in undergraduate education*

The increased number of available graduate specialty programs in North America presents a challenge for our own M.Sc. and Ph.D. with dental specialty training programs. Many of the external programs provide stipends whereas, with only 2 exceptions, we do not. To sustain our ability to attract high calibre applicants under these circumstances, we will continue to focus on sustaining high quality programs from the perspectives of both academics as well as student experience. In addition, the Graduate Department will pursue innovative ways to offer greater flexibility in terms of both scope and breadth for applicants.

Alumni Engagement

This has been a long-time area of weakness for the Faculty. Efforts at improving the student experience will hopefully result in long-term improvement in this regard. The very recent appointment of a new Director of Advancement will help us optimize the activity of our Alumni Relations office to rectify this situation. We will assess the impact of our improved communications with our alumni through such vehicles as our UofT Dentistry magazine.

Financial Challenges

The reality of the structural deficit will be an ongoing issue. As described earlier, we will continue to attempt to find ways to both increase resources and manage expenses, so that the financial challenges do not impair our ability to carry out our research, teaching and clinical service missions. We will continue to seek meetings with the Ministry of Training, Colleges and Universities as well as the Ministry of Health and Long-Term Care to show them how their interests do align with a strong Faculty of Dentistry.

Opportunities

We need to take measures to sustain the high quality of applicants for our D.D.S. and graduate programs. We have been very fortunate in this regard until now. Yet, it would be wrong to be complacent, as applicants have many other dental schools from which to select. We need to do what we can to continue to attract high calibre students. As such, we need to investigate means to sustain quality in both the curriculum and the student experience.

The introduction of the new professorial teaching stream at the University of Toronto could allow us to accomplish much of what a clinical track ("Professor of Practice") would have achieved. Thus, our long-term plan is to gradually increase this cohort in the future.

Overall, our 2014-19 Strategic Plan has given us direction to implement change that is necessary to keep our Faculty moving forward. As detailed earlier, there have been a number of positive accomplishments since its inception. Acknowledging that change can be difficult, this has only been made possible through the engagement of our faculty, staff and students. Continuing to capitalize on this momentum will serve us well for the future.

APPENDICES