

# FACULTY OF DENTISTRY

## Self-Study 2021

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UNIVERSITY OF TORONTO  
FACULTY OF DENTISTRY

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# **1. INTRODUCTION & 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 undergraduate program for the Doctor of Dental Surgery (D.D.S.) degree is the largest in Canada. 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 456 undergraduate students.

Its graduate programs offer 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 & maxillofacial radiology, oral & maxillofacial surgery, oral & maxillofacial pathology and oral medicine, orthodontics & dentofacial orthopedics, and dentofacial orthopedics, 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 & 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 120 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 10 dental schools in Canada, data from Science Citation Index Expanded (SCIE) show that U of T ranks first in publications and first in citations. When compared with dental schools in North America, data from Science Citation Index Expanded (SCIE) show that among public universities it ranks fourth in publications and seventh in citations, and among private and public, it ranks seventh in publications and eleventh in citations.

Areas of research strength and future growth in the Faculty include multidisciplinary approaches in the fields of biomaterials, connective tissue and regenerative medicine, dental public health, education research, microbiology, oral pathology and cancer, and pain and neuroscience.

The Faculty also provides direct service to the community, as part of its mission and clinical education role. This makes it unique among Faculties within the university. The Faculty is the largest dental clinic in Canada, with 266 dental chairs. It has 15,000 active patients and recorded approximately 90,000 patient visits annually in pre-Covid-19 years. Service learning also takes place through outreach clinics which currently include those at Toronto Public Health, St. Michael's Hospital, the Centre for Addiction and Mental Health, as well as globally. In non-Covid-19 years, electives take place in Ethiopia, Uganda, Honduras, Guatemala, and Niigata Japan, with hopes that these will resume 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, Mount Sinai Hospital, Sunnybrook Health Sciences Centre, Princess Margaret Cancer Centre, Holland Bloorview Kids Rehabilitation Hospital, Michael Garron Hospital, and Humber River Hospital, 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 co-director, assistant professor Rachael Bosma, has an appointment with our Faculty. 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 Biomedical Engineering (BME). The BME 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 BME is an internationally recognized unique interdisciplinary and collaborative research unit which pursues research in three theme areas: molecular engineering, cell and tissue engineering, and clinical engineering. The Institute currently awards graduate students degrees through its Biomedical Engineering concentration (M.A.Sc., Ph.D. Biomedical Engineering, Ph.D. Biomedical Engineering – Clinical Engineering concentration) and its Clinical Engineering M.H.Sc. 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 BME. Its director from 2008-2013 was professor Paul Santerre, who is appointed with our Faculty.

The programs at the Faculty of Dentistry align with the mission of the University of Toronto, which reads: *"The University of Toronto is committed to being an internationally significant research university, with undergraduate, graduate and professional programs of excellent quality."* As stated in our Strategic Plan 2014-2019, (see Appendix 3) and Strategic Plan Update 2019-22, (see Appendix 4), the vision of the Faculty of Dentistry is that we improve health by advancing dentistry through inspired leadership, innovation and excellence in

education, research and practice. The mission of the Faculty of Dentistry is to 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.

As detailed later in this document, the undergraduate and graduate programs are consistent with our vision and mission as outlined in our Strategic Plans.

## Strengths & 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. We were honored to receive the 2021 William J. Gies Award for Achievement from the American Dental Education Association ADEAGies Foundation. This distinction recognizes the immense contributions that our faculty members have made over the years to improve the health of so many. Many of our faculty members have also been recognized with individual awards. Among others, a few examples include Barry Sessle's receipt of the IADR Gold Medal, Christopher McCulloch's receipt of the Canadian Association of Dental Research/Association of Canadian Faculties of Dentistry National Research Award, Paul Santerre's receipt of the Governor General's Innovation Award and the Manning Innovation Award.

With respect to international comparators, the Faculty has seen a gradual rise in its rankings. When QS first began to rank dentistry in 2015, our dental school ranked 50th. It generally rose over the years (2016: 47th, 2017: 48th, 2018: 42nd, 2019: 37th) to 36th place in 2020, and then was ranked 38th in 2021. The Shanghai Ranking began to rank dentistry in 2017, when our Faculty placed 22nd, rising up to 20th in 2018, before falling to 30th in 2019, 36th in 2020, and rising again to 25th in 2021. Among dental schools in Canada, the 2021 QS rankings has UofT as number 2, and the Shanghai rankings has UofT as number one.

In 2018 we opened our revitalized research facilities, following securing funding for partial support from the federal government. This major infrastructure project saw the top 2 floors

of our building completely renovated where we reconfigured 95 small laboratories into 21 larger facilities with expanded usable space. This enabled almost all of our researchers to now be located in one facility, which was not the case previously, where one group of 5 CIHR-funded scientists were working out of facilities on main campus. The open concept design also facilitates collaborations and interactions among faculty and graduate students.

Most recently, we have arranged for the construction of a satellite clinic, located within walking distance of our primary building. As detailed in the section on Infrastructure, this 15,000 square foot clinic will house 41 enclosed operatories. It will provide extra capacity for our clinical education programs, and serve as swing space for when we proceed with renovations to our simulation lab and one of our existing large clinics.

A number of self-assessments have been done to improve our programs and services over the past number of years. As indicated above, our academic programs have been guided by our Strategic Plan 2014-2019, (see Appendix 3) and Strategic Plan Update 2019-22, (see Appendix 4) Achieving Impact through Excellence. The most recent yearly Progress Reports for 2019-20 and 2020-21 (see Appendices 5 and 6) are attached to demonstrate our accomplishments in achieving our goals. Since the last Self-Study and UTQAP carried out 5 years ago, we have also undertaken a number of self-initiated external reviews. Among others, these include the 2016-17 review of our Student Services Office (see Appendix 22) the 2018 review of our Continuing Dental Education division (see Appendix 24), the 2018 review of our Clinical Operations, (see Appendix 20) and most recently, in 2021, a review entitled Re-Envisioning Dental Education At The University of Toronto, carried out by Dr. Richard Valachovic, President Emeritus, American Dental Education Association, and Sally Garner, Senior Strategist, Operational Initiatives, University of Toronto and past executive director of Planning and Budget (see Appendix 25). The aim of this latest review was to consider how our education programs could be re-envisioned to accomplish financial sustainability. In 2019 and 2020 we have also undergone accreditation reviews by the Commission on Dental Accreditation of Canada for our D.D.S. program (see Appendix 10) and our 9 nationally recognized specialty programs (see Appendix 14). These external reviews provide valuable information for us to strengthen our academic programs.

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 as best as possible.

Infrastructure challenges are significant. Our building at 124 Edward St was built in 1959, with a major expansion in 1982 and a complete renovation of our research facilities in 2018. Yet, the clinic infrastructure is aged. A clinic master plan was commissioned and carried out in 2019, and completed in January 2020 as described in the section on Infrastructure. This is

an excellent proposal that includes an 8-stage implementation phasing program. Its great limitation is the financial cost to carry it out. As such, we are selecting phases to implement incrementally, in order of priority/need. The first phase is the implementation of a Medical Device Reprocessing (MDR) unit, which will be completed in the fall of 2021. The next 2 phases are currently being developed with architectural consultants being hired. The first will be the renovation of our simulation lab (Lab 4) into 124 new stations equipped for digital dentistry and updated support spaces. This will be followed by the renovation of one of our largest clinics, Clinic 2, which will see the addition of a new Clinic 3 in the space above it, and will consolidate all undergraduate clinical instruction by providing 120 multi-purpose enclosed operatories for patient care.

Recruitment of academics into clinical streams has historically been very challenging. This is a finding shared by others, where data have shown that there are over 271 openings for full time academics in dental schools in North America (Wanchek et al, Journal of Dental Education 2017; 81:1033-1043). 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.

The continued competition for shrinking research dollars has become a reality for most Canadian universities. As discussed in the section on Research, our principal investigators have still remained successful in spite of this reality, yet it nevertheless is still a concern as we look to the future.

The challenges that the Covid-19 restrictions have brought on still remain. It limited our ability to carry out our research program, particularly for those carrying out face-to-face clinical research. It has had a major impact on our education programs.

For our D.D.S. program, public health and government-mandated restrictions impeded our ability to deliver our teaching. While the move to online learning is understandable, dentistry requires a large degree of in-person training. In the 2020-21 year, all didactic teaching was done remotely. Yet, in-person training in the simulation labs and in the clinics is still a requirement for our students to meet the accreditation standards.

There were 2 restrictions that impeded us. One was on in-person class-size limit, the other was on the use of aerosol-generating procedures.

From November 2020 to May 2021, the Ontario government mandated a 10-person limit to in-person teaching when it was deemed essential. Almost all other health profession training programs were given an exemption to allow them to teach 50 students at a time, but

dentistry was not included. In spite of a great deal of advocacy, this restriction was not lifted until late May 2021. The result was that our D.D.S.-1, D.D.S.-2, and IDAPP students had extended classes during the year and had to return in the summer to gain the training necessary in order to let them begin their next academic year in September 2021.

In October 2020, dentistry's regulatory authority (RCDSO) mandated fully enclosed operatories for any aerosol-generating procedure. Of the 263 dental chairs in our building, only 22 were fully enclosed. This had a major impact on our D.D.S.-3, D.D.S.-4, and graduate clinical specialty programs. We converted 3 rooms to add enclosed operatories, added evening sessions, and a number of Saturday sessions in order for our students to get enough exposure to gain clinical competency prior to graduation. At the time of writing this Self-Study, to our knowledge, only Ontario's 2 dental schools have this restriction, when compared to the other 74 dental schools in Canada and the United States. The other schools have had their open concept clinics functioning with aerosol-generating procedures for well over one year now, without any report of Covid-19 spread. This decision by Public Health Ontario and the RCDSO has put the 2 Ontario schools at a disadvantage.

Finally, the greatest challenge the Faculty faces is its financial sustainability. The section on Financial Structure describes our efforts in this regard. To investigate ways forward, as mentioned above, in 2021 we commissioned a review entitled *Re-Envisioning Dental Education at The University of Toronto*. We are now considering its recommendations (see Appendix 25).

In summary, the Faculty of Dentistry has many strengths and continues to fulfill its missions in research and education. Challenges do remain, and we are actively pursuing means to mitigate them.

## **2. SELF-STUDY PARTICIPATION**



# Self-Study Participation

The Vice-President and Provost commissioned this Self-Study as part of the University of Toronto's Quality Assurance Process. 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 graduate 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 Laura Tam, associate dean undergraduate education
- professor Ernest Lam, associate dean graduate education
- Mary Choi, assistant dean administration and chief administrative officer
- professor James Posluns, director of clinical affairs
- Selina Esteves, director of advancement
- Dr. Christopher Swayze, director of continuing dental education
- Samantha Freeman-Attwood, Faculty registrar
- Helen He, Faculty librarian

In the fall of 2021, all faculty, instructors, staff, and student leaders, were sent access to a draft report for their review and invited to provide written feedback over a 3-week period. As well, all were invited to consultation sessions, with 4 individual sessions arranged for each group (faculty, instructors, staff, student leaders). Feedback from the written submissions and the consultation sessions were then taken into account in the preparation of the final report.



### **3. PREVIOUS REVIEW RECOMMENDATIONS**

## Overview

The last UTQAP External Review of undergraduate and graduate programs was conducted 5 years ago. The previous review is enclosed in Appendix 1 and its response is enclosed in Appendix 2. The external reviewers were: Dr. Cecile A. Feldman, dean, Rutgers School of Dental Medicine; Dr. E. Dianne Rekow, executive dean, Dental Institute King's College London; and Dr. John N. Williams, dean, Indiana University School of Dentistry. The Review was very insightful and pointed out our programs' strengths and challenges. It made a number of valuable recommendations. The manner in which we addressed key recommendations is summarized below.

## Undergraduate Program

The reviewers encouraged the Faculty to determine the most useful new technologies currently employed in clinical practice and develop a plan to incorporate these into the traditional educational program now and in the future.

The Faculty investigated the use of a number of technologies for our programs. In the undergraduate clinic the availability of CAD/CAM (computer-aided design and computer-aided manufacturing) scanning, rotary endodontic canal preparation systems, and digital 2D and 3D x-ray imaging have been implemented. At the graduate level, we have implemented microscopy in endodontics, digital implant treatment planning and placement technology in periodontics, digital records have been incorporated in orthodontics & dentofacial orthopedics, and virtual treatment planning of multi-jaw orthognathic surgery cases in oral and maxillofacial surgery.

With respect to clinical management and Information Technology, axiUm®, the clinic management system, continues to be expanded. A new dispensary module was implemented initially in the undergraduate clinics with expansion into the graduate clinics in the fall of 2021. It is anticipated that the clinic management system will be fully integrated with the new central sterilization centre (MDR) by early 2022. This integration improves accountability, alleviates student responsibility of instrument reprocessing and permits greater focus on clinical skills development.

With respect to didactic teaching and learning, we had adopted a method for online course evaluation and electronic testing (Examsoft®, which included the implementation of live, digital invigilation/proctoring). This proved to be valuable when Covid-19 arose and restrictions forced all of us to go online. This prior experience smoothed the transition to online assessments. All didactic teaching during the Covid-19 restrictions was done online.

Electronic education material through the Dental Procedure Education System (DPES) continues to be developed.

Reviewers suggested that student experiences in patient care might be improved through more effective recruitment of patients as teaching cases.

The Faculty recognizes the need to address this matter. The Covid-19-induced restrictions on the mode of delivery of clinical care mandated by Public Health Ontario, and therefore the Royal College of Dental Surgeons of Ontario (RCDSO), made this issue even more challenging. The closure of the clinics in March, 2020, coupled with a reduction in capacity from July 2020 to the present has led to an increase for available patient demand. Whether or not this pent-up demand is temporary or permanent, remains uncertain. Overall, students do gain a solid foundation in basic care. Whereas their experiences could be strengthened in a few areas of more advanced, and costly, care. Even though our clinics charge reduced fees (on average, approximately 50% of the Ontario Dental Association fee guide) our patient demographic is such that financial constraints limit their ability to undergo all dental procedures that, in turn, can have an impact on student experience. The Access to Care Fund currently exists to mitigate the financial barriers for patients in need. Challenges do remain in pediatric dentistry, with the introduction of more favorable coverage in private practice resulting in no financial advantage in coming to the Faculty.

## **Graduate Programs**

Reviewers recommended reviewing all 10 specialty programs for consistency with program and Faculty mission, need/demand and financial performance; they suggested this could lead to consolidation or redesign.

In the 2021 external review *Re-Envisioning Dental Education at The University of Toronto*, by Rick Valachovic and Sally Garner (see Appendix 25), they were asked to identify changes that could be considered to improve the financial model and if the Faculty should continue with all 10 programs. Their conclusion was to not eliminate or change the size of any of the graduate specialty programs at this time.

The reviewers recommended redesigning M.Sc. program and degree options to address any mismatch between existing programs outcomes and student desired outcomes, especially in relation to research activities.

Shortly after the last UTQAP review our associate dean graduate education conducted a review of all of our graduate specialty programs and proposed a restructuring plan of the Faculty's graduate offerings. Following discussion with the Provost's office and Planning and

Budget, it was determined to not pursue this plan. Yet, similarly, the Valachovic-Garner report did recommend that we *“Reconsider the requirement that all graduate specialty students pursue a research-based M.Sc. degree in addition to qualification for a certificate.”* This will be re-evaluated in the future.

## Students

Reviewers recommended that the Faculty evaluate the quality and responsiveness of student support provided by the Registrar and related offices and make modifications if indicated.

The Faculty commissioned an external review of its Student Services Office (see Appendix 22). Its stated objective was written as follows: *“The review will consider the functioning and services of the Faculty Registrar’s office, with a view to promoting effective delivery of services and provision of support to promote student success.”* In October 2016, a 2-day site visit was conducted by a 3-person team and a report provided in early 2017. This report can be found in Appendix 22. A number of changes have been implemented addressing the above concerns, including a change in the leadership of the Student Services Office.

## Research

Reviewers encouraged the Faculty to implement the findings and recommendations of the April 2015 review of research.

The plan to address this recommendation was being led by our vice-dean research. In order to improve communication and collaboration between basic science, clinical, public health, and educational researchers, we established “Research Rounds” as a monthly venue for all faculty members involved in all research areas to discuss current issues including opportunities to improve communication and stimulate collaboration.

The need for consistent representation at appropriate research-related university councils and committees was addressed by the vice-dean research’s participation as a member of the university’s Research Advisory Board. This has improved visibility of research at the Faculty of Dentistry on an institutional level.

Reviewers observed that articulating priorities and focusing on fewer areas may maximize research investment.

Led by the vice-dean research, the Faculty’s Office of Research has identified 7 main themes of research focus: biomaterials, connective tissue and regenerative medicine, dental public

health, education research, microbiology, oral pathology and cancer, and pain and neuroscience.

## **Faculty**

Reviewers suggested that the Faculty review faculty composition to optimize the balance between part-time and full-time; they suggested that an optimal balance and better mechanisms for calibration across teaching staff could strengthen teaching and consistency of instruction across all programs, including clinical teaching.

As mentioned elsewhere in this document, there is an ongoing challenge recruiting full-time academics in the clinical fields. Also, as mentioned earlier, the Faculty has been reducing the number of small percentage (less than 40%) part-time appointments. As well, we have been gradually increasing the proportion of teaching stream faculty to more appropriately recruit for clinical fields.

## **Resources & Planning**

Reviewers suggested we develop plans to ensure financial stability, including around clinical operations, without negatively impacting the current quality of research or teaching.

This is clearly one of the most significant challenges for the Faculty of Dentistry. The reality of running a clinical education program within the university is the primary source of this problem. Rising costs of delivering dentistry, as seen by examples such as elevated standard of care in infection control, electronic patient records, and digital radiography, outweigh the clinical income as our patients are charged reduced fees. The recent Valachovic-Garner report made a number of recommendations in this regard, including pursuing a plan for intramural faculty practice and initiating an AEGD. We will also engage our government relations division to have discussions with the provincial government to seek increased funding for clinical education.

Reviewers recommended that the Faculty complete the renovations of its research laboratories and develop a capital plan to enable the renovation or building of new facilities to create a modern clinical facility.

The research revitalization program was a success. The renovation of our entire research facility was on schedule completed on time, and under budget, in spring of 2018.

## **4. ACADEMIC PROGRAMS**

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

## Program Overview

The 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. The curriculum consists of didactic, simulation and clinical training that covers biomedical, behavioural and clinical sciences. 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 Appendix 9. 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 D.D.S./D.M.D. programs is included as Appendix 10.

The D.D.S. program is consistent with the university's mission which *"is dedicated to fostering an academic community in which the learning and scholarship of every member may flourish, with vigilant protection for individual human rights, and a resolute commitment to the principles of equal opportunity, equity and justice."* 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

## **Program Design**

### **Program Learning Outcomes**

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 following are the program learning outcomes. The graduates are required to achieve this level of competency. Competency is a global statement of the complex knowledge, skills, and attitude required of a beginning general dentist. The five competencies are based on the Association of Canadian Faculties of Dentistry (ACFD) Educational Framework for the Develop of Competency in Dental Programs (see Appendix 9). The Commission on Dental Accreditation of Canada uses this document for accreditation of the undergraduate dental program.

**COMPETENCY 1 – PATIENT-CENTRED CARE:** The application of professional knowledge, skills and values in the provision of patient-centered care.

- apply knowledge of the clinical, socio-behavioural, and fundamental biomedical sciences relevant to Dentistry.
- perform a complete and appropriate assessment of patients.
- demonstrate appropriate diagnostic and treatment planning skills.
- demonstrate appropriate preventive skills.
- demonstrate appropriate therapeutic skills.
- recognize own limits and seek appropriate consultation from other health professionals where appropriate.

**COMPETENCY 2 – PROFESSIONALISM:** The commitment to the oral health and well-being of individuals and society through ethical practice, reflective learning, self-regulation and high personal standards of behaviour.

- demonstrate a commitment to patients and the profession by applying best practices and adhering to high ethical standards.
- demonstrate a commitment to society by recognizing and responding to the social contract in dental health care.
- demonstrate a commitment to personal health and well-being to foster optimal patient care.



- demonstrate a commitment to the profession by adhering to standards and participating in profession-led regulation.

COMPETENCY 3 – COMMUNICATION and COLLABORATION: The effective facilitation, both individually and as part of a healthcare team, of the dentist-patient relationship and the dynamic exchanges that occur before, during, and after a patient interaction.

- establish professional therapeutic relationships with patients and their families.
- elicit and synthesize accurate and relevant information along with the perspectives of patients and their families.
- engage patients and others in developing plans that reflect the patient’s dental health care needs and goals.
- document and share written and electronic information about the dental encounter to optimize clinical decision-making, patient safety, confidentiality, and privacy.
- work effectively with other dentists and other health care professionals.
- work with dentists and other colleagues in the health care professions to promote understanding, manage differences, and resolve conflicts.
- hand over the care of a patient to another health care professional to facilitate continuity of safe patient care.

COMPETENCY 4 – PRACTICE AND INFORMATION MANAGEMENT: The assessment of information and the management of a general dental practice to facilitate patient-centered care.

- implement processes to improve professional practice.
- employ information technology appropriately for patient care.
- apply the principles of evidence-based decision making into practice.

COMPETENCY 5 – HEALTH PROMOTION: The responsible use of professional expertise and influence to advance the health and well-being of individual patients, communities, and populations.

- work with patients to address social determinants of health that affect them.
- work with patients and their families to increase opportunities to improve or maintain their health.
- respond to the oral health promotion needs of a community or population.

## **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 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 Indigenous peoples and international applicants.

The Faculty welcomes applications from Indigenous 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 Indigenous ancestry receive special consideration for admission. The Wilson G. Harron Award and Gladys Watson Education fund are available to assist a limited number of Indigenous students with the financial expenses associated with their dental education. As indicated later in this document, for 2022 the Faculty will be introducing the Dr. Fritz Hoerner Bursary for *“Indigenous, Black, or ... other under-represented groups”*. Over the last 5 years, the Faculty had 12 self-identified Indigenous applicants and offered two positions.

International applications are encouraged; however, they must meet the same admission requirements and standards as those for Canadian applicants. Most of these applications are from the U.S.A. because most dentistry courses from overseas are first entry programs and hence applicants generally cannot meet our entry prerequisites.

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.

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. The IDAPP is described in the section on Internal and External Partnerships, on pages 156 and 157.

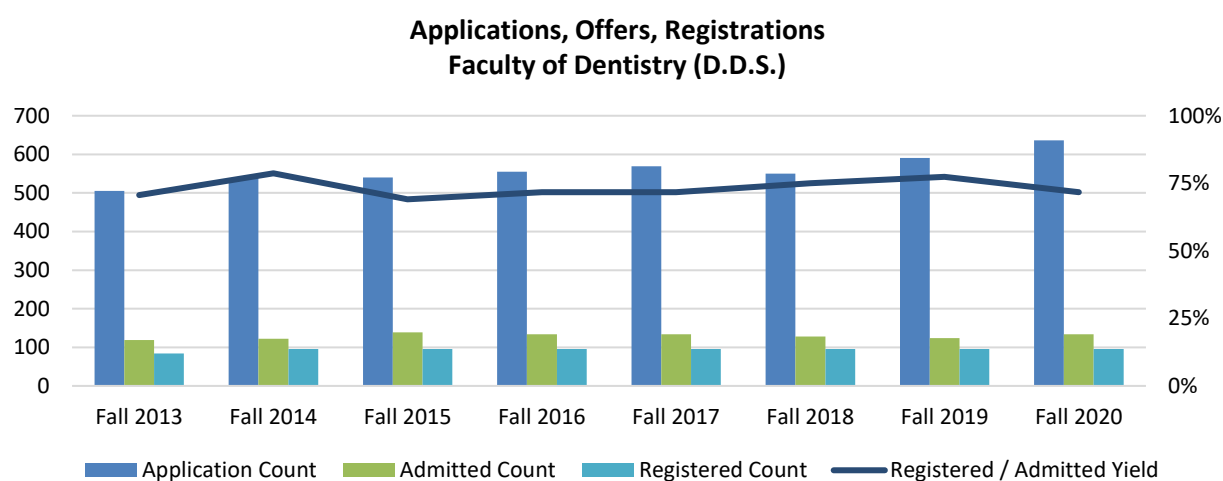
Applications for the D.D.S. program have been steadily climbing for the last 5 years with a low of 550 applications to a high last year of 636. The ratio of offers to acceptances has remained relatively consistent. The mean grade point average (GPA) of students accepted into the program has remained consistently high over the past 5 years. It has remained at least 3.90 or higher.

## Undergraduate Student Quality Indicators Applications, Offers & Registrations

### Faculty of Dentistry

	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Application Count	505	538	540	555	569	550	591	636
Admitted Count	119	122	139	134	134	128	124	134
Registered Count	84	96	96	96	96	96	96	96
<b>Registered / Admitted Yield</b>	<b>70.6%</b>	<b>78.7%</b>	<b>69.1%</b>	<b>71.6%</b>	<b>71.6%</b>	<b>75.0%</b>	<b>77.4%</b>	<b>71.6%</b>

Source: Faculty of Dentistry Registrar's office



## Undergraduate Student Quality Indicators Grade Level Admissions

### Faculty of Dentistry

	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
FT Registrations	84	96	96	96	96	96	96	96
Entering Averages	3.90	3.90	3.90	3.91	3.93	3.93	3.94	3.92

Source: Faculty of Dentistry Registrar's Office

The cumulative GPA of the graduates are in the range of 3.42 to 3.62 and the seven-year graduation rate is 98.5%. This demonstrates the appropriateness of the program requirements where the admitted students are able to succeed.

## Undergraduate Student Quality Indicators

### Final-year academic achievement

#### Faculty of Dentistry

Program Name		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Dentistry D.D.S.	Graduates	91	93	96	103	120	118	121	119
	CGPA*	3.42	3.43	3.45	3.53	3.51	3.53	3.52	3.62

\*CGPA=Cumulative Grade Pt Avg

Data Source: ROSI custom query

#### Notes:

1. Final cumulative grade point average (CGPA) is based on all percentage grade marks in your courses during registration in the program.
2. The academic year consists of Fall, Winter, Summer terms. For example, the 2019-20 academic year consists of Fall 2019, Winter 2020 and Summer 2020 terms.

## Graduation and Employment Quality Indicators

### Seven-Year Graduation Rate (MCU Methodology)

#### 2011 Cohort Graduating by 2018

The Ministry of Colleges & Universities calculates graduation rates by identifying a single entering cohort of students and determining whether or not they graduated within seven years. The methodology employed involves the selection of all new full-time, Year One undergraduate students on the official Fall 2011 enrolment file, who have a valid (and unique) student ID number, and were seeking either a bachelors or first professional degree. The subset was then matched against the records for students who received a degree (in any program) from the same institution during the period 2011-2018.

Program	Cohort	University of Toronto	Ontario Universities
<b>Arts &amp; Sciences (3 campuses at U of T), Music</b>			
Agriculture & Biological Science	x	x	76.9%
Business & Commerce	2,032	80.4%	78.7%
Computer Science	x	x	63.3%
Fine & Applied Arts	118	83.1%	71.6%
Forestry	---	---	---
Humanities	---	---	66.9%
Journalism	---	---	77.3%
Mathematics	---	---	73.6%
Other Arts & Science	7,153	75.6%	73.1%
Other Health Professions	33	87.9%	82.3%
Physical Sciences	x	x	68.0%
Social Sciences	265	75.1%	67.7%
<b>Other First Entry Programs (U of T)</b>			
Architecture & Landscape Architecture	---	---	88.3%
Engineering	1,171	88.0%	77.3%
Kin/Rec/PhysEd	174	87.4%	81.2%
<b>Second Entry Programs (U of T)</b>			

<b>Dentistry*</b>	<b>66</b>	<b>98.5%</b>	<b>98.4%</b>
Education (teacher training, includes CTEP)	1,040	98.4%	97.2%
Law	204	95.6%	91.6%
Medicine	270	98.1%	98.7%
Nursing	119	96.6%	85.6%
Pharmacy	281	98.6%	98.6%
Theology	41	68.3%	67.9%
<b>U of T Average</b>	<b>12,967</b>	<b>81.1%</b>	<b>76.9%</b>

Source: Ministry of Colleges & Universities (MCU): Universities' Key Performance Indicators

\*Since 2016, the D.D.S. program has grown to the current entry class size of 96 students.

Notes:

1. "---" indicates no data available.
2. To ensure respondent's confidentiality, cell counts less-than or equal-to 5 are displayed as "X".
3. Degree Completion Rate for undergraduate cohort, fall new, year 1 students vs. graduates over 7-year period.
4. "Other Arts and Science" includes students enrolled in all Arts and Science programs except for students in Commerce, Computer Science and the UTM/Sheridan Fine Art/Drama program.
5. "Other Health Professions" includes students enrolled in the B.Sc. in Biomedical Communication.

Diversity is an important consideration in our D.D.S. classes, and we are proud that the majority of our students are of racially and ethnically diverse backgrounds, and generally over 50% of our incoming classes are female.

Total Offers of Admission	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Male	58	42	76	60	68	71	46	62
Female	61	53	63	70	66	57	78	72

Source: Faculty of Dentistry Registrar's Office

We initiated our first diversity survey. This survey consists of self-declared responses from the incoming class in 2020 and response rate was 95.8%. The table below highlights specific categories. For the full survey results, see Appendix 13.

Identity	2020
LGBTQ2S+	2.2%
Other	0.0%
Prefer not to answer/no response	1.1%
Self-identify as visible minorities/person of colour	40.2%
Do not self-identify as visible minorities/person of colour	44.6%
Prefer not to answer/no response	15.2%
White	24.0%
Asian (32.6% East Asian, 22.8% South Asian)	53.3%
Middle Eastern	19.8%
Black	0.0%
Indigenous (e.g. First Nations, Inuit, Metis)	0.0%

Latino/Hispanic	1.0%
Mixed race	3.3%
Prefer not to answer/no response	0.0%
Buddhist	0.0%
Christian	24.0%
Hindu	7.6%
Jewish	7.6%
Muslim	17.4%
Sikh	5.4%
No Religion	31.5%
Prefer not to answer/no response	6.5%
Other	0.0%
<b>Country of Birth</b>	<b>2020</b>
Born in Canada	55.4%
Born outside of Canada	43.5%
Prefer not to answer/no response	1.1%
Parent(s)/primary guardian(s) born in Canada	17.4%
Parent(s)/primary guardian(s) born outside of Canada	82.6%
Prefer not to answer/no response	0.0%

We recognize the need to increase the number of Black and Indigenous students. To this end, the Faculty's Admissions Committee is currently creating an alternative pathway for Black and Indigenous applicants to the D.D.S. program. In a further effort to support the diversity in our student population, a new bursary with an endowment of \$500,000, the Dr. Frtiz Hoerner Bursary, has been set up for *"undergraduate student(s) who are either Indigenous, Black, or from other under-represented groups."* The award will commence in 2022, and is to be given to a student each year for the duration of their 4-year program.

Current efforts to improve the pipeline of diverse applicants for the future can be seen by the Faculty of Dentistry's financial contribution to, and an active participation 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.

## **Program Requirements**

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. In addition, the ACFD competency framework followed by the Faculty is very robust and also aligns with our program requirements.<sup>1</sup>

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, the functions of this committee include the following:

- assure the quality and standards of the Faculty's undergraduate dental programs.
- plan the curriculum in terms of the knowledge and competencies needed for graduates of the undergraduate programs.
- determine which courses in the undergraduate curricula shall be required for standing in the undergraduate dental programs, and make recommendations to Council.
- monitor and integrate the curriculum.
- receive written reports from the Director of the CCP.
- be responsible for the program in hospital dentistry for undergraduate students.
- give advice and recommend policies on undergraduate educational matters pertaining to clinic operations and patient care.
- seek out and consider educational innovations taking place in other dental and health science institutions. \*

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<sup>1</sup> In the context of the Province of Ontario, the DDS is viewed as a second-entry undergraduate program. The alignment of the DDS accreditation competencies with the broad OCAV undergraduate DLE categories was confirmed in 2008 and described here: <https://www.vpacademic.utoronto.ca/wp-content/uploads/sites/225/2018/11/dle-dent-dds.pdf>. While this document has not been formally updated to reflect the revised DDS accreditation competencies, we are confident that DDS graduates go well beyond achieving the competencies for undergraduate degrees in the province of Ontario. Indeed, we expect that they have largely achieved these competencies on admission, since the minimum admission requirement is "completion of 3 years of undergraduate study."



- foster the development and application of innovative educational methods in the undergraduate dental programs, including appropriate faculty training. \*
- foster the development and use of valid and reliable measures for assessing the outcomes of the Faculty's educational programs. \*
- form ad hoc Working Group(s) charged with planning and developing items (\*) or others as may be necessary and reporting to the Committee.
- 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 descriptions are also outlined in the Faculty calendar (included as Appendix 18).

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 D.D.S.-3 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. The 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 11.

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.

## **Curriculum Design**

The curriculum design is based on the competencies as outlined in the ACFD Educational Framework for the Development of Competency in Dental Programs. The alignment between

the learning outcomes and courses are demonstrated by the curriculum map. Course directors completed the curriculum mapping based on their respective course learning outcomes and identified whether the learning outcomes are taught didactically, preclinically, and/or clinically.

The curriculum map demonstrates that all ACFD competencies are taught and how these competencies are aligned with the courses. The curriculum map demonstrates a gradual transition from didactic to preclinical to clinical training throughout the entire four years. The vertical column of each “courses” demonstrates the relationship of the individual course learning outcomes to the ACFD competencies. With respect to the interrelationship of subjects or courses, each row represents an Indicator or Component of the ACFD competencies. (See Figures 4.1 and 4.2) The full undergraduate curriculum map can be read in detail in Appendix 12.

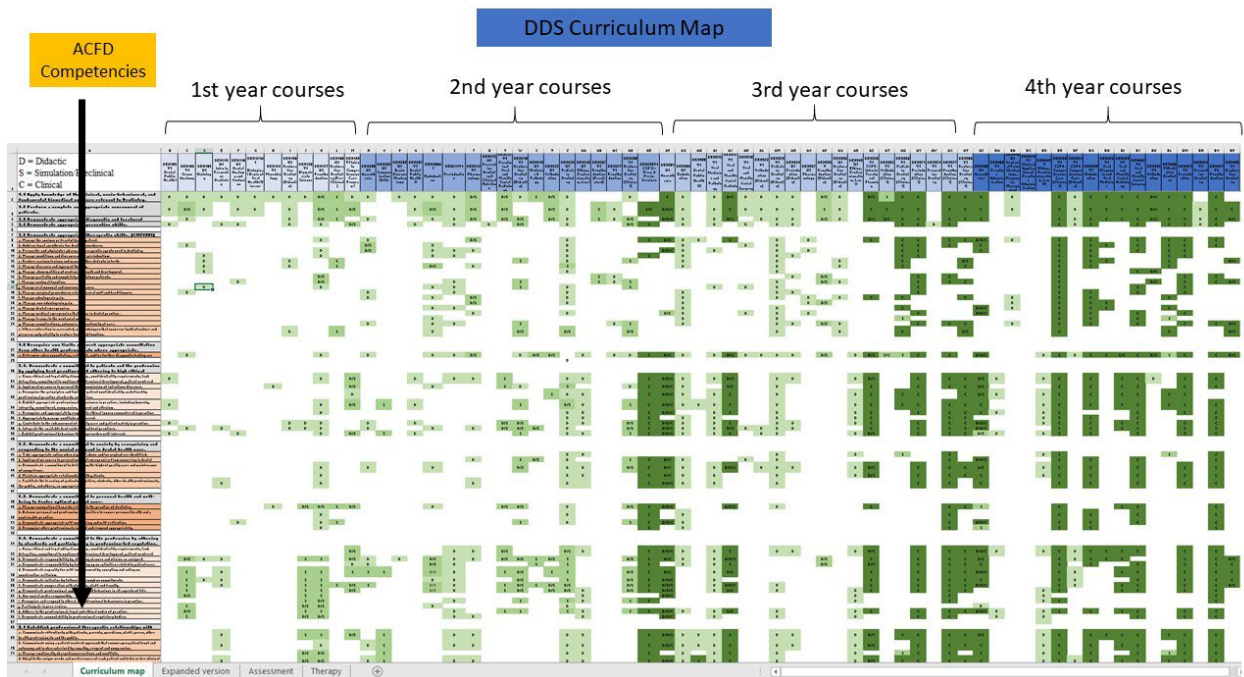


Figure 4.1:

- The left column are the components of the ACFD competencies.
- The top row lists all the D.D.S. courses arranged chronologically from first year to fourth year.
- Each “course” column represents a specific course and the competencies components taught in that specific course are mapped in green.
- The curriculum map demonstrates that all the ACFD competencies are taught.

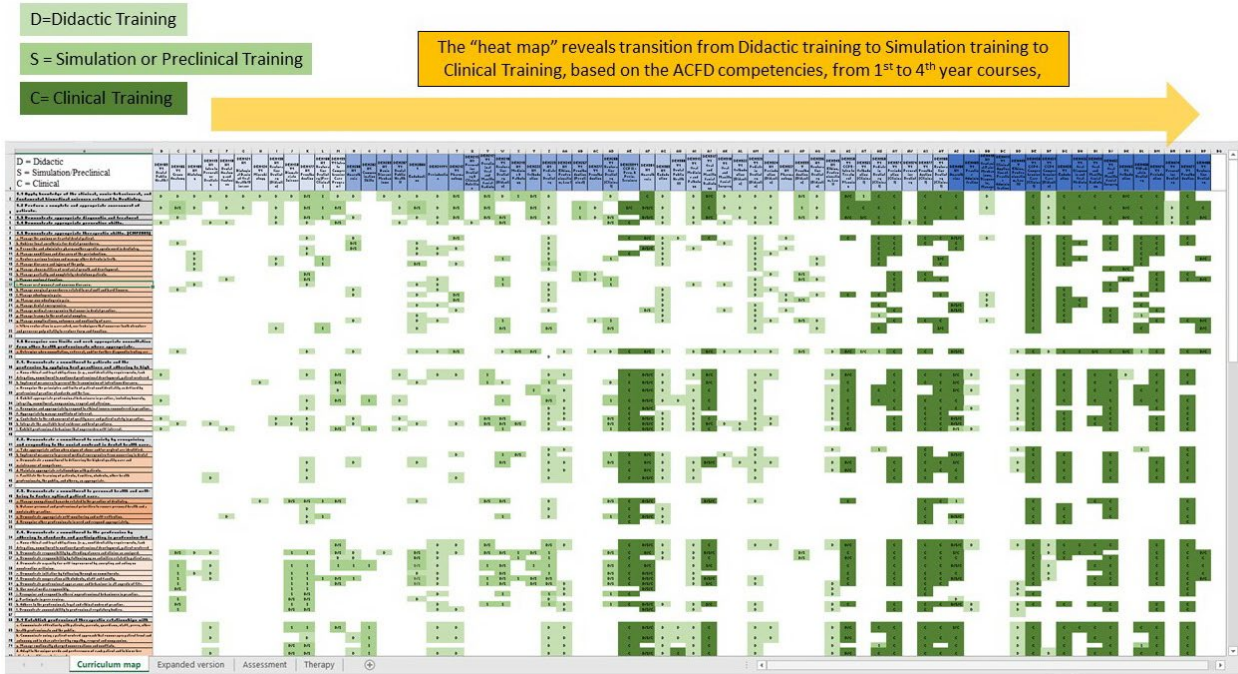


Figure 4.2:

- Light green represents didactic training, moderate green represents simulation training and dark green represents clinical training.
- The curriculum map demonstrates the integration of biomedical, behavioural, and clinical science content.
- The "heat map" reveals the green colour progressively becomes darker as the curriculum transition from first year basic science courses (that are taught didactically) to fourth year clinical science courses (that are taught clinically).

The row demonstrates that the Competency Indicator spans over numerous courses and the "teaching concept" of the Indicator is integrated across the curriculum from basic sciences courses to clinical science courses (see Figure 4.3). In other words, the rows for each Competency Indicators demonstrate the interrelationship of subjects that span from first year to fourth year (see Figure 4.3).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
D = Didactic																											
S = Simulation/Preclinical																											
C = Clinical																											
1.5 Demonstrate appropriate therapeutic skills. (CMF2005)																											
d. Manage conditions and diseases of the periodontium.		D	D		D		D	D			D		C	D	D	D		C	C		C	C		C	C		
e. Restore carious lesions and manage other defects in teeth.		D	D	D		S				S	D	S		D	D		D	C		SC	C	C	C	C			DC
f. Manage diseases and injury of the pulp.		D	D	D		S	D/S			D		S		D	D		D	C		C	C	C		C			

Figure 4.3:

- This demonstrates the interrelationship between courses that teach 1.5d. (Manage conditions and diseases of the periodontium). Histology, Microbiology, Prosthodontics, Endodontics, Periodontics, Pediatric Dentistry, CCP are interrelated with 1.5d and the relationship progresses from didactic training to clinical training.
- Similar examples are provided for 1.5e and 1.5f.

- The respective rows for each competency indicators demonstrate the interrelationship of subjects that span from first year to fourth year.

See Appendix 11 for the list of courses in the program.

## **Curriculum Map**

See Appendix 12 for the completed curriculum map in excel format. The tab (in the Excel document) labelled “Curriculum map” highlights the components of the five competencies (patient centered care, professionalism, communication and collaboration, practice and information management, and health promotion). The tab labelled “Expanded version” provides a more detailed mapping of the indicators observed during dental education to the D.D.S. courses. The tab “Therapy” are examples of the interrelationship of subjects. Curriculum renewal has been one of the directions of our Strategic Plan, as indicated in our Strategic Plan Update 2019-22 (Appendix 4: pages 9-10), as well as the yearly Progress Reports (Appendix 5: pages 4-6;and Appendix 6: page 4).

## **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 clinical affairs, 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, student clinical 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 director of clinical affairs, 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 D.D.S.-4 who have a shortfall of specific MCEs, a system of "within-class" referrals has been developed to provide specific items of treatment.

The quality of the curriculum design and delivery is reflected by the 100% post-graduation employment rate for our graduates. The student course evaluations demonstrate a consistent good learning experience.

### Graduation & Employment Quality Indicators – Employment Rates

#### 2016 Graduates of Undergraduate Degree Programs

To determine employment rates of recent graduates, the Ministry of Colleges & Universities (MCU) commissioned a survey of all 2016 graduates of undergraduate degree programs.

Results are not available by campus.

Program	University of Toronto		Ontario Universities	
	6 months	2 years	6 months	2 years
<b>Arts &amp; Sciences (3 campuses at U of T), Music</b>				
Agriculture & Biological Science	76.7%	93.0%	83.8%	94.6%
Business & Commerce	85.1%	96.8%	91.0%	96.6%
Computer Science	83.8%	98.2%	85.2%	97.0%
Fine & Applied Arts	85.7%	93.0%	86.5%	93.8%
Food Science & Nutrition	X	85.7%	89.7%	94.1%
Forestry	---	---	---	---
Humanities	86.9%	91.1%	89.1%	93.7%
Journalism	X	X	87.1%	94.2%
Mathematics	80.6%	94.1%	85.5%	94.5%

Other Arts & Science	83.8%	89.2%	88.4%	95.6%
Other Health Professions	80.5%	92.5%	83.6%	93.2%
Physical Sciences	85.4%	84.1%	86.3%	91.2%
Social Sciences	86.8%	92.9%	88.8%	94.5%
<b>Other first Entry Programs (U of T)</b>				
Architecture & Landscape Architecture	95.2%	95.2%	90.5%	94.1%
Engineering	88.7%	93.7%	87.3%	94.9%
Kin/Rec/PhysEd	98.1%	95.3%	92.1%	94.4%
<b>Second Entry Programs (U of T)</b>				
Dentistry	100.0%	100.0%	100.0%	100.0%
Education (teacher training, includes CTEP)	97.4%	100.0%	94.9%	97.4%
Law	91.1%	99.0%	95.2%	95.3%
Medicine	94.0%	97.3%	97.0%	98.4%
Nursing	94.3%	100.0%	91.3%	98.2%
Pharmacy	89.0%	98.9%	91.2%	97.7%
Theology	---	---	88.0%	100.0%
<b>U of T Average</b>	<b>86.7%</b>	<b>94.1%</b>	<b>89.1%</b>	<b>95.2%</b>

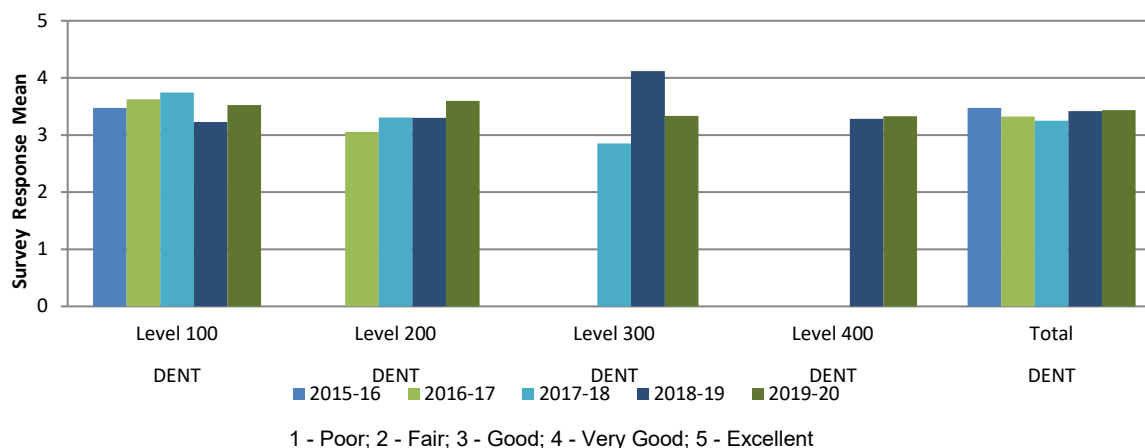
Source: Ministry of Colleges & Universities (MCU): Universities' Key Performance Indicators

Notes:

1. "---" indicates no data available.
2. To ensure respondent's confidentiality, cell counts less-than or equal-to 10 are displayed as "X".
3. Graduate Employment Rate is the number of graduates of bachelors or first professional degree programs expressed as a percentage of the labour force after graduation.
4. "Other Arts and Science" includes the majority of students enrolled in Arts and Science programs. Commerce and the UTM/Sheridan Fine Art/Drama programs are reported separately.
5. "Other Health Professions" includes students enrolled in the B.Sc. in Biomedical Communication.
6. Graduates were asked information on their employment outcomes six months and two years after graduation.
7. Of the 11,440 graduates from University of Toronto undergraduate programs, 3,372 or 29.7% responded to the survey.
8. Further information about the survey is available on MCU website:

<http://www.iaccess.gov.on.ca/OsapRatesWeb/enterapp/overview.xhtml>

**Overall, the quality of my learning experience in this course was:**



## **Curriculum Delivery**

The curriculum map demonstrates that our teaching methods and student learning activities are effectively integrated and coordinated so that students' educational experiences are comprehensive and promote their ability to demonstrate decision-making and critical thinking skills. 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.

Extramural educational experiences and internal rotations to specific disciplines and other health related settings are complementary to the existing core program within the institution.

If there are extramural or internal rotations, scheduling must be done to ensure that student progress within the core program is not compromised by these experiences and rotations.

For intramural rotations, in first and second year, groups of students are sent to specific clinics during clinical rotations, where they are assigned by that clinic to assist the D.D.S.-4 class.

In third year, students are rotated through graduate periodontics, graduate endodontics and the graduate oral reconstruction clinic throughout the year. At any time, a clinic may make an announcement indicating space is available for any student with free time who wishes to assist in the clinic allowing for additional sessions. Additional intramural rotations include assignments to the oral diagnosis, oral radiology and oral surgery clinics. There is an internal rotation hosted jointly by pediatric dentistry and dental anaesthesia. Each D.D.S.-4 student is assigned once to attend this rotation in the graduate dental anaesthesia clinic in the pediatric surgicentre.

Undergraduate dental students gain extramural experience by going on assigned rotations to 4 Hospitals: Mount Sinai Hospital, Sunnybrook Health Sciences Centre, the Hospital for Sick Children, and the Princess Margaret Cancer Centre, all of which have dental services that are approved by the CDAC. These rotations provide an overview of medicine and dentistry for the medically compromised patient. As part of their pediatric dentistry experience, students attend the City of Toronto Community Health Clinic (Victoria Street) and Mount Sinai Hospital to perform dental treatment on disabled children and adults, as required. DEN490Y Community Based Service Learning has all D.D.S.-4 students rotate and provide clinical treatment at George Brown College, Toronto Public Health, St. Michael's Hospital and the Centre for Addiction and Mental Health (CAMH). Students have elective periods of clinical experience. DEN491 Dental Outreach Community service offers an elective

community-based rotation at a volunteer dental clinic in Haliburton, Ontario and DEN492 Dental Outreach Global Services offers an elective international rotation at locations such as Uganda, Honduras, Guatemala, Dominican Republic, and Ethiopia. These external rotations have been put on pause during this period of Covid-19 restrictions.

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

## **Quality Enhancement**

The 2014-19 Strategic Plan and the 2019-2022 Strategic Plan Update identified a number of areas for improvement of the learning and teaching environment.

For the fourth year of the 2014-2019 plan (2017-2018), the following were priorities related to enhancing the quality of the D.D.S. program:

- renew, standardize and strengthen evaluation, testing and grading of students, including student self-assessment.
- develop a formal program to strengthen teaching quality across undergraduate and graduate programs.
- determine feasibility of introducing a model to better integrate basic science into clinical training in undergraduate education

For the first year of the 2019-2022 Strategic plan update, the following are directions related to enhancing the quality of the D.D.S. program:

- Direction 1: Education.
  - Continue with D.D.S. and graduate curriculum renewal.
  - Review of D.D.S. admissions process.
  - Explore the feasibility of Advanced Education Programs.
- Direction 2: Clinical Care
  - Clinic Facilities Renewal.
- Direction 3: Research
  - Integrate research with education and clinics.
- Direction 4: Our People
  - Strengthen a culture of professionalism.
  - Wellness initiatives.
- Direction 5: Strengthen our Organizational Impact
  - Promote international recognition.



- Financial sustainability.
- Strategic recruitment of faculty.

Working groups assigned to each of these action items strive towards the same goal of quality enhancement. This can be seen in our Strategic Plan, as indicated in our Strategic Plan Update 2019-22 (Appendix 4: pages 9-10), as well as the yearly Progress Reports (Appendix 5: pages 4-6; and Appendix 6: page 4). As stated therein, the 2014-19 Strategic Plan led to numerous curricular changes. Ongoing reviews to strengthen the vertical and horizontal integration of the D.D.S. program led to a number of courses being reviewed or fully integrated to reduce redundancy. Online course evaluations were started. A committee for professional development of faculty was formed, with the inaugural Education Day taking place in 2018. Positive changes to the admissions process for the D.D.S. program have been implemented. Even though much has been accomplished, curriculum reform has been an ongoing objective.

## **Co- or Extracurricular Opportunities**

Extramural educational experiences and internal rotations to specific disciplines and other health related settings are complementary to the existing core program within the institution.

If there are extramural or internal rotations, scheduling must be done to ensure that student progress within the core program is not compromised by these experiences and rotations.

As stated above, undergraduate dental students gain extramural experience by going on assigned rotations to 4 hospitals: Mount Sinai Hospital, Sunnybrook Health Sciences Centre, the Hospital for Sick Children, and the Princess Margaret Cancer Centre, all of which have dental services that are approved by the CDAC. These rotations provide an overview of medicine and dentistry for the medically compromised patient. As part of their pediatric dentistry experience, students attend the City of Toronto Community Health Clinic (Victoria Street) and Mount Sinai Hospital to perform dental treatment on disabled children and adults, as required. A specific course, DEN490Y Community Based Service Learning was developed. All D.D.S.-4 students rotate and provide clinical treatment at George Brown College, Toronto Public Health, St. Michael's Hospital and the Center for Addiction and Mental Health (CAMH). Students have elective periods of clinical experience. DEN491 Dental Outreach Community service offers an elective community-based rotation at a volunteer dental clinic in Haliburton, Ontario and DEN492 Dental Outreach Global Services offers an elective international rotation at location such as Uganda, Honduras, Guatemala, Dominican Republic, and Ethiopia. These external rotations have been put on pause during this period of Covid-19 restrictions.

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

## **Assessment of the Program Relative to the Best of its Kind Offered in Canada, North America, & Internationally**

The QS World University Ranking based on Dentistry has ranked University of Toronto at number 38, and the Shanghai Global Ranking has University of Toronto at 25. Among the 10 Canadian dental schools, only one is ranked higher than the university on the QS ranking, and U of T is ranked number one in Canada on the Shanghai Ranking. The American Dental Education Association awarded U of T the William J. Gies Award for Achievement – Academic Dental Institution in 2021.

## **GRADUATE PROGRAMS: M.Sc. & Ph.D.**

### **Program Overview**

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. These 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 without clinical specialty training (dental biomedical sciences) are research-intensive programs intended for individuals with a primary interest in research. The M.Sc. and Ph.D. degrees may also be combined with clinical specialty training in all of the dental specialties recognized in the province of Ontario. This includes the dental specialties (dental public health, endodontics, oral & maxillofacial pathology and oral medicine, oral & maxillofacial radiology, oral & maxillofacial surgery, orthodontics & dentofacial orthopedics, pediatric dentistry, periodontics, and prosthodontics) recognized and accredited by the Commission on Dental Accreditation of Canada (CDAC). A copy of the CDAC requirements for the graduate specialty programs is included in Appendix 14. These educational programs provide graduates with competency in the knowledge, skills and abilities required for entry-level specialty practice in Canada. Graduates of these programs are also eligible to challenge the National Dental Specialty Examination (NDSE) in their respective specialty, currently administered by the National Dental Examining Board of Canada (NDEB) and the Fellowship Examination, administered by the Royal College of Dentists of Canada. Candidates who have successfully completed the NDSE can then register

as clinical specialists and obtain a license to practice through the provincial/territorial dental regulatory authorities. The graduate department also offers M.Sc. and Ph.D. programs with clinical specialty training in dental anaesthesia, a clinical specialty that is recognized by the Royal College of Dental Surgeons of Ontario.

The University of Toronto is the only Canadian university that offers clinical specialty training in all of the nationally recognized dental specialties and dental anaesthesia, and is the sole Canadian university offering clinical specialty training in dental anaesthesia, dental public health, and oral & maxillofacial radiology. The Faculty also offers a unique M.Sc. program in dental public health that is open to dental hygienists who have completed a 4-year baccalaureate degree in dental hygiene and dental hygiene clinical training from a recognized university.

Table 4.1 summarizes the normal program lengths for the M.Sc. and Ph.D. programs in dental biomedical sciences and clinical specialty programs, the minimum time required by the accrediting agency (CDAC) for the clinical specialty programs, and the maximum annual enrolments in each clinical specialty programs.

**Table 4.1: M.Sc. & Ph.D. with Dental Specialty Normal Program Lengths and Maximum New Registrants Per Year**

	Normal M.Sc. Program Length	Normal Ph.D. Program Length	CDAC <sup>1</sup> Minimum Program Length	Maximum New Registrants/Year
Dental Biomedical Sciences	2 years	5 years	-	-
Dental Public Health	2	5	2 Academic Years <sup>2</sup>	4
Dental Anaesthesia	3	6	-	2
Endodontics	3	6	2	3
Oral & Maxillofacial Pathology and Oral Medicine	4	7	4	1
Oral & Maxillofacial Radiology	3	6	3	2
Oral & Maxillofacial Surgery	4	7	48 months	2
Orthodontics & Dentofacial Orthopedics	3	6	2	4
Pediatric Dentistry	3	6	2	4
Periodontics	3	6	3	3
Prosthodontics	3	6	3	2

<sup>1</sup>The Commission on Dental Accreditation of Canada.

<sup>2</sup>An academic year is defined as being 11 months in length.

# Program Design

## Program Learning Outcomes

### 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 in a field of science, employment in a research environment and/or clinical specialty practice. The objectives of the M.Sc. program are to:

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

Our objectives for the M.Sc. degree programs broadly align with the five expectations of the 2018 M.Sc. Graduate Degree Level Expectations of the University of Toronto; namely Depth and Breadth of Knowledge, Research and Scholarship; Level of Application of Knowledge; Professional Capacity/Autonomy; Level of Communications Skills; and Awareness of Limits of Knowledge. As our M.Sc. degree offerings are very broad, understandably, some of the demonstrated skills may be more or less applicable to students who are not concurrently enrolled in a clinical specialty program in the profession of dentistry (e.g., 4.b., the “intellectual independence required for continuing professional development”). A full summary of the Graduate Degree Level Expectations for the M.Sc. can be found here on page 1 of the linked document: <https://www.vpacademic.utoronto.ca/wp-content/uploads/sites/225/2018/11/dle-grad.pdf>

The typical length of the M.Sc. (dental biomedical sciences) program is 2-3 years. When completed with clinical specialty training, the length of M.Sc. program can vary from 2-4 years, depending on the program (Table 4.1).

Table 4.2 summarizes the numbers of applicants to the M.Sc. (dental biomedical sciences) program between the academic years 2015-16 and 2019-20, the numbers of offers made and new registrants. For applicants to the M.Sc. (dental biomedical sciences) program, the number of students accepted per year is determined by the availability of funding (i.e.,

stipend support and tuition) from the principal investigator. If the applicant is an international student, the principal investigator is responsible for paying the tuition fee differential for the duration of the student’s enrolment, and some principal investigators are reluctant to do this as this ostensibly doubles the principle investigator’s tuition commitment. Some applicants to the M.Sc. (dental biomedical sciences) program have the intention of applying to a professional program (e.g., M.D., D.D.S. etc.) at a later date.

**Table 4.2: Applications, Offers & Registrations in the M.Sc. (Dental Biomedical Sciences)**

	2015-16	2016-17	2017-18	2018-19	2019-20
<b>Applications</b>	27	23	24	24	39
<b>Offers</b>	5	11	5	6	10
<b>New Registrants</b>	4	10	1	4	7

All M.Sc. programs require the student to undertake didactic coursework and a research project. The research project is supervised by a university faculty member with an unrestricted “Associate” or “Full” appointment in the School of Graduate Studies, and a supervisory committee. In the case of the M.Sc. (clinical specialty) programs, students also undertake clinical work. Clinical specialty students may choose to complete a traditional doctoral-stream M.Sc. thesis or a course-based M.Sc. For students enrolled in the course-based M.Sc., an additional 1.5 full course equivalents (FCE) of coursework, which includes the 0.5 FCE course, DEN1061H (Research Practicum). The research practicum is defended in an oral examination in lieu of the traditional thesis.

A curriculum map for the M.Sc. (dental biomedical sciences) program can be found under Appendix 15.

## Doctor of Philosophy:

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

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

While the objectives for students in the Ph.D. degree program may sound similar to those of the M.Sc. program, our expectations are that Ph.D. students elevate themselves to a higher level of achievement and understanding of their field compare with M.Sc. degree students. As well, it is a necessary requirement that Ph.D. degree students develop the skills necessary to become an independent or principal investigator. The program’s objectives broadly align with the five expectations of the 2018 Ph.D. Graduate Degree Level Expectations of the University of Toronto; namely Depth and Breadth of Knowledge, Research and Scholarship; Level of Application of Knowledge; Professional Capacity/Autonomy; Level of Communication Skills; and Awareness of Limits of Knowledge. As our Ph.D. degree offerings may also be combined with clinical specialty training in the profession of dentistry, some of the University’s expectations may be more applicable to these students (e.g., 1.a. “A thorough understanding of a substantial body of knowledge that is at the forefront of ... clinical practice.”; 3.b., “Contribute to the development of ... professional skills.”; 4.b., “The intellectual independence to be ... professionally engaged and current.”). A full summary of the Graduate Degree Level Expectations for the Ph.D. degree can be found here on page 2 of the linked document: <https://www.vpacademic.utoronto.ca/wp-content/uploads/sites/225/2018/11/dle-grad.pdf>

Ph.D. (dental biomedical sciences) acceptances is determined by the availability of funding by the principal investigator. For Ph.D. students, there is now no longer a tuition differential between domestic and international students. Historically, most applicants who have requested direct entry into the Ph.D. program are international students whose governments provide funding for them. Table 4.3 summarizes the Applications, Offers, and Registrations into the Ph.D. (dental biomedical sciences program).

**Table 4.3: Applications, Offers, and Registrations in the Ph.D. (Dental Biomedical Sciences)**

	2015-16	2016-17	2017-18	2018-19	2019-20
<b>Applications</b>	11	5	14	14	24
<b>Offers</b>	1	1	2	0	6
<b>New Registrants</b>	1	1	2	0	6

The typical length of the Ph.D. (dental biomedical sciences) program is 4 to 5 years. A Ph.D. student selects a research project that is supervised by a faculty member who must hold a “full” appointment in the School of Graduate Studies, and a supervisory committee. The student is required to undertake didactic coursework and a research project. As well, all Ph.D. students must prepare a written thesis and defend the thesis in an oral examination.

A curriculum map for the Ph.D. (dental biomedical sciences) program can be found under Appendix 15.

A listing and description of all courses offered in the graduate department can be found in Appendix 15.

## **Admission Requirements**

### **Master of Science:**

Applicants to the M.Sc. program in dental biomedical sciences must hold an appropriate four-year baccalaureate degree or 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.

Applicants to an 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 an appropriate four-year baccalaureate, Master's or D.D.S. degree (or its equivalent) with an average of at least an A- (3.70 GPA), or demonstrate 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 applicants to M.Sc. and Ph.D. programs, 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 (e.g., the Test of English as a Foreign Language, TOEFL).

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



## Clinical Specialty Programs:

Applications to the Faculty’s clinical specialty training programs have remained strong, although there have been some year-to-year fluctuations. In particular, we have observed that a number of these students, once accepted, have withdrawn for “personal reasons” at or near the start date 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 our waiting list may have already accepted a position in another program. In comparison, we receive far fewer applications for the Ph.D. (dental specialty) programs, and fewer students are registered. Students enrolled in these programs must complete both the requirements for the M.Sc. and Ph.D. (dental biomedical sciences) requirements and the clinical requirements for entry-level specialist dental practice.

Tables 4.4 and 4.5 summarize the Applications, Offers, and Registrations to the M.Sc. and Ph.D. (clinical specialty) programs.

**Table 4.4: Applications, Offers, and Registrations in the M.Sc. (Clinical Specialty)**

	2015-16	2016-17	2017-18	2018-19	2019-20
<b>Applications</b>	200	224	233	238	195
<b>Offers</b>	35	34	32	28	34
<b>New Registrants</b>	28	25	25	23	21

In comparison with the M.Sc. (Clinical Specialty) programs, fewer applications are received for our Ph.D. (Clinical Specialty) programs. Table 4.5 summarize the numbers of applicants to the Ph.D. (Clinical Specialty) programs, numbers of offers made and numbers of acceptances.

**Table 4.5: Applications, Offers & Registrations in the Ph.D. (Clinical Specialty)**

	2015-16	2016-17	2017-18	2018-19	2019-20
<b>Applications</b>	12	18	16	18	19
<b>Offers</b>	1	1	0	0	1
<b>New Registrants</b>	0	1	0	0	0

## Program Requirements

All M.Sc. and Ph.D. students, whether in the dental biomedical sciences or clinical specialty programs are required to complete DEN1010H (Research Ethics), DEN1015H (Biostatistics), and DEN1001Y/DEN1100Y (Oral Health Science Seminars) as core courses within these



programs. How these core courses support the program learning outcomes for the programs is indicated in the curriculum maps, as can be seen in Appendix 16.

The DEN1001Y/DEN1100Y Oral Health Science Seminar course is designed to demonstrate research progress, develop and enhance presentation skills to a large audience, field questions and chair a seminar session. This is a credit (CR)/no-credit (NCR) course.

## **Master of Science:**

As a part of DEN1001Y (Oral Health Sciences Seminar), all M.Sc. students are required to:

- present one 20-minute seminar during the final year of their research.
- submit online, a 250-words (max.) abstract for their seminar at least 1 week before their presentation, to be circulated.
- present one poster at the Faculty of Dentistry Research Day.
- complete an anonymized peer-evaluation to be submitted online in Quercus after each session attended.
- act as Chair of one session.

All M.Sc. 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 (Unrestricted) or Full membership status in the School of Graduate Studies. At least one committee meeting is required in each academic year (prior to June 30).

At the completion of the program, the student produces a thesis or research report (in the case of students enrolled in the course-based M.Sc. program) 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 accepted into the M.Sc. program in dental biomedical sciences 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 covered by graduate department funds. 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 after 12 months and within 24 months of registration. M.Sc. students undertaking clinical specialty training 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 24-36 months.

As part of the transfer request, the student prepares a research proposal and a 20-minute presentation that is defended orally in an examination, chaired by the associate dean, 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:**

As a part of DEN 1100Y (Oral Health Sciences Seminar), all Ph.D. students are required to:

- present at the 3-minute thesis event during their 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> years.
- present two 20-minute seminars.
- present two posters at two Faculty of Dentistry Research Days.
- submit online, a 250-words (max) abstract for their seminar at least 1 week ahead of their presentation, to be circulated.
- complete an anonymized peer-evaluation to be submitted online in Quercus after each session attended.
- chair two sessions.

After 12 months and within 24 months of registration, the student challenges the Ph.D. Qualifying Examination. The student prepares a proposal a 20-minute presentation that is defended orally in an examination. The Qualifying Examination is chaired by the associate dean, 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 their home 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 covered by the graduate department. 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 Long-term 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.

## **Curriculum Design**

### **Curriculum Maps**

The curriculum maps for all programs can be found in Appendix 16.

### **Assessment of Learning**

Performance in didactic or clinical coursework is evaluated by individual course directors.

Assessment of students is undertaken through written and oral examinations, major course projects, practicum report(s), and a written thesis and its oral defense. Student progress is monitored yearly (or more frequently) through 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; and their ability to respond to Committee member questions. As well, following an update on the student's research progress, the following additional 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. 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 defense).

Students enrolled in a clinical specialty program are also monitored yearly (or more frequently) by their graduate specialty program directors with respect to the student's clinical skills development.

In the final year of the program, an informal study group to prepare students for the National Dental Specialty Examination (NDSE) and the Royal College of Dentists of Canada (RCDC) fellowship exam 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 and RCDC fellowship exam that students demonstrate achievement of the program learning objectives and the program's degree level expectations.

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 and 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, lowest priority for bursaries and assistantships, or termination of registration.

## **Clinical Specialty Programs**

### **DENTAL ANAESTHESIA**

#### **Curriculum & 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:

- 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.
- have the skills for life-long learning, for critical evaluation of the literature, and for the evidence-based practice of anaesthesia.
- become educators and researchers in the field of anaesthesia for dentistry.

Graduates will be able to:

- apply the requisite knowledge of the sciences relevant to anaesthesia in preparing and implementing an anaesthetic plan.
- perform pre-operative risk assessment to identify medical conditions or practice limitations requiring consultation and/or referral of the patient.
- 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.
- provide anaesthetic management for the special-needs dental patient.
- manage anaesthetic emergencies at a skill level at or above that of Advanced Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS).
- manage anaesthesia-related problems in post-anaesthetic recovery.
- perform and teach the full spectrum of local anaesthetic techniques required for dentistry.
- critically evaluate the research literature pertaining to anaesthesia in dentistry.
- 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 underserved by the general dentistry community. The program provides clinical experiences which systematically expose students to these patient populations, in preparation for a specialist clinical practice. Furthermore, clinical rotations at the Faculty, Sunnybrook Health Sciences Centre, and Mount Sinai Hospital in anaesthesia provide students with exposure to not only hospital-based anaesthesia but ambulatory office-based anaesthesia, which is the practice reality for most dentist anaesthesiologists 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 student 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 program director to discuss their individualized learning and research plans.

The program is divided into approximately 26 months of clinical training and 10 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 wish to complete the American Dental Board of Anaesthesia (ADBA) Diplomate exam, which is required for application for specialty licensure 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 Michael Garron Hospital, Sunnybrook Health Sciences Centre, the Hospital for Sick Children, Mount Sinai Hospital, and Women’s College Hospital. 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 dental and maxillofacial sciences providing deep sedation/GA cases on adult dental patients in our clinics. It is expected that 10 months will be spent with the department of anaesthesia at teaching hospitals. This currently is comprised of 8 months at Michael Garron Hospital and 2 months at the Hospital for Sick Children. Students return to the Faculty for a 6-month period to administer general anaesthetics on pediatric dental patients. A 1-month rotation in Team Medicine takes place at Sunnybrook Health Science Centre and a 1-month rotation takes place in Cardiology and Respiriology Departments at Women’s College Hospital. To further complement didactic teaching, students attend a 1-month rotation at the combined locations of Orofacial Pain Clinics at Sunnybrook Health Sciences Centre and Mount Sinai Hospital’s Pain Management Clinic. Each student completes a course in the adult Advanced Cardiac Life Support (ACLS) course successfully within their



first year. Students subsequently complete a course in Pediatric Advanced Life Support (PALS) prior to their participation in pediatric care.

Efforts have also been made to incorporate 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 students.

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 are 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 students to return to participate as educators, either in the graduate program as a clinical instructor or as faculty, as well as in dental continuing education courses.

Our curriculum delivery features annual simulation-based master classes or learning workshops that introduce and reinforce core airway management skills and common anaesthesia emergencies as well as bi-annual simulation sessions to provide students with experiences in anaesthesia emergencies that they may otherwise not encounter. Students receive additional training in anaesthesia emergencies in the hospital simulation labs. These in-situ team simulations are focused on not only clinical content, but additionally environmental and team factors.

The recent integration of web-based technology (e.g., learning management system, assessment platforms) to advance curriculum delivery has enabled the ability to deliver high-quality online content and to engage the student in test-enhanced learning activities in both asynchronous and synchronous formats.

The time-based model of clinical curriculum delivery facilitates the longitudinal nature of rotations at various Faculty and hospital 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 Michael Garron Hospital (e.g., block 1 in year 1 and block 2 in year 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 student progress, as they encounter the same evaluators in these rotations.

Given recent developments in health professions education to transition from time-based to competency-based models, the delivery of our clinical program has prompted curriculum review and renewal to incorporate the best structural elements of the competency-based model (e.g., entrustable professional activities, work-based assessments) to showcase students’ achievement of graduation competencies.

Our program has been strengthened by providing students with formal education in pedagogy and clinical teaching experiences. These experiences take students outside of their own classroom environment and allow them to experience the role of the instructor. Students 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. Students 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.

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<i>First Term</i> Research Ethics (DEN1010H) Introduction to Biostatistics (DEN1015H) Basic Principles of Dental Anaesthesia (DEN1055H) Basic Concepts in Clinical Medicine (DEN1056Y) Dental Anaesthesia Graduate Seminars (DEN1073Y) Foundations of Medicine as Applied to Dental Anaesthesia (DEN1074Y) General Anaesthesia for Medical Procedures – Adult I (DEN1076H) General Anaesthesia for Dental Procedures – Adult I (DEN1078H) Experiences in Clinical Teaching I (DEN1084H)	<i>First and Second Terms</i> Seminars in Oral Health Sciences (DEN1001Y) General Anaesthesia for Medical Procedures – Pediatric (DEN1052Y) Medical Anaesthesia Seminars I (DEN1071Y) Experiences in Clinical Medicine (DEN1083Y) Experiences in Clinical Teaching II (DEN1085H) Fundamentals of Dental Anaesthesia II (DEN1088Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) or Research Practicum (DEN1061H)	<i>First and Second Terms</i> Seminars in Oral Health Sciences (DEN1001Y) Medical Anaesthesia Seminars II (DEN1072Y) General Anaesthesia for Dental Procedures – Pediatric (DEN1075Y) General Anaesthesia for Medical Procedures – Adult II (DEN1077H) General Anaesthesia for Dental Procedures – Adult II (DEN1079H) Experiences in Clinical Teaching III (DEN1086H) Fundamentals of Dental Anaesthesia III (DEN1089Y) Clinical Conferences (PDE9094Y) Research (RST9999Y) or Research Practicum (DEN1061H)



<p>Fundamentals of Dental Anaesthesia I (DEN1087Y)  Research (RST9999Y) or Research Practicum (DEN1061H)</p> <p><i>Second Term</i>  Clinical Epidemiology and Evidence-Based Care (DEN1014H)  Basic Concepts in Clinical Medicine (DEN1056Y)  Dental Anaesthesia Graduate Seminars (DEN1073Y)  Foundations of Medicine as Applied to Dental Anaesthesia (DEN1074Y)  General Anaesthesia for Medical Procedures – Adult I (DEN1076H)  General Anaesthesia for Dental Procedures – Adult I (DEN1078H)  Experiences in Clinical Teaching I (DEN1084H)  Fundamentals of Dental Anaesthesia I (DEN1087Y)  Research (RST9999Y)</p>		
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A curriculum map for the Dental Anaesthesia program can be found under Appendix 16.

## **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:

- **Student Portfolio Review.** Students meet for a 30-minute interview with the program director twice yearly, in December and June. All program assessments are discussed at this meeting, and 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 provide 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.
- **Evaluations of Individual Patient Care Encounters.** Students are provided with formative evaluations of their patient care encounters using a direct observation assessment tool. These work-based evaluations are shared and discussed with

students daily at the end of the clinical care day. The evaluations are electronically submitted to the program director for formal review at the bi-annual portfolio reviews.

- Evaluations from Rotations. Students are provided with a summative evaluation of their performance or participation at hospital rotations. The program director reviews this document at formal review at the bi-annual portfolio reviews.
- Informal Instructor Feedback. Beyond patient care evaluations, discussion of student performance is sought informally throughout the year from individual clinical instructors by the program director. Student performance is also discussed at year-end clinical instructor staff meetings, where clinical instructors have an opportunity to discuss their student teaching encounters with each other and triangulate their experiences with different students. The program director acts on these discussions by relaying this feedback to students, and if recommended, makes plans for remediation based on instructor feedback.
- Student Logs. Patient care encounters are detailed by students formally in an electronic tracking system. The total number and diversity of patient care encounters is reviewed by the program director with students to ensure they meet accreditation standards. Students 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.
- Anaesthesia Rounds. Embedded in the core course “Fundamentals of Dental Anaesthesia” is a program of clinical rounds. Students 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.
- Simulation Experiences. Twice yearly students participate in in-situ team simulations in the Faculty of Dentistry clinical spaces. Simulations may be recorded to allow video-assisted debrief for rich discussions of content and team performance.
- Mock Written Board Examination. Once yearly in February, students participate in a mock written board examination. This examination is administered by the American Dental Board of Anesthesiology (ADBA). Students 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.
- Oral Examination. Twice yearly students are assessed through oral examination by a panel of staff examiners, with similar content range and exam conditions to the American Dental Board of Anesthesiology (ADBA) specialty board examination. Students receive a performance level 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.
- 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 student progress. Through this documentation which occurs throughout training, by the final year of the program, students 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 students' success at taking the American Dental Board of Anesthesiology (ADBA) written and oral board 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 (31 total) since 2002 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 & 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 (table below and Appendix 16) and associated learning outcomes are based on the Commission on Dental Accreditation of Canada's core and applied competencies.

Year 1	Year 2
<p><i>First Term</i></p> <p>Dental Public Health Seminars (DEN1006Y)            Research Ethics (DEN1010H)            Introduction to Biostatistics (DEN1015H)            Oral Epidemiology (DEN1051Y)            Clinical Conferences (PDE9094Y)            Thesis/Research (RST9999Y)            Approved Option I*</p> <p><i>Second Term</i></p> <p>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)</p>	<p><i>First Term</i></p> <p>Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y)            Clinical Conferences (PDE9094Y)            Thesis/Research (RST9999Y)            Approved Option II*            Approved Option in Health Policy, Health Economics*</p> <p><i>Second Term</i></p> <p>Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y)            Management Principles in Canadian Dental Health Organizations (DEN1064H)            Clinical Conferences (PDE9094Y)            Thesis/Research (RST9999Y)</p>

\* 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.

The program does not solely focus on training dentist specialists, and has broadened its focus to train dental hygienists as well. 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).

The research undertaken in the program and the program's curriculum reflect the state-of-the-art in the specialty of dental public health. 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. 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.

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 Royal College of Dental Surgeons of Ontario asked the program to help them in their effort to understand trends in public complaints made to the regulator. This resulted in significant funding, student work experiences, publications, and in various case studies for 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 gives students opportunities to travel and present their research at local, national, and international conferences.

A curriculum map for the dental public health program can be found under Appendix 16.

## **Assessment of Learning**

Performance in didactic or clinical coursework is evaluated by individual course directors. Assessment of students is undertaken through written and oral examinations, major course projects and practicum report(s).

## **ENDODONTICS**

### **Curriculum & 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; 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:

- Attract first-class scholars and clinical teachers who have demonstrated ability and achievement in research, education and clinical practice.
- Attract outstanding and highly motivated graduate students.
- Educate endodontists with career goals in academics, clinical practice, and community service.
- Foster quality innovative research that elucidates the biology of endodontic diseases and that improves diagnosis and therapy for these diseases.
- Foster in the students a commitment to lifelong learning, excellence and professionalism.

- 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.
- Foster cooperation, collaboration, collegiality and loyalty among the program teachers and students, and among the program graduates.
- 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.
- 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.
- 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:

- Clinical research: epidemiology, treatment outcomes
- Root canal irrigation: agents, delivery methods
- Root canal instrument properties
- Disease and treatment mediated dentin tissue changes
- Bacteria-host tissue interaction
- Advanced antibiofilm & regenerative strategies
- Photodynamic therapy and nano-biomaterials
- Bioengineering

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 3 full-time and 2 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, the Faculty operates 2 high-resolution, small field-of-view size cone beam CT imaging systems which provides advanced imaging services to the graduate students.

The faculty and students have established an international reputation in the endodontic community through extensive publication, invited lectures and winning major awards and prizes. 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.

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<i>First Term</i> 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)	<i>First Term</i> 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)  <i>Second Term</i> Temporomandibular Disorders* (DEN1017H)	<i>First Term</i> 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)  <i>Second Term</i> 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)



<p><i>Second Term</i></p> <p>Oral &amp; Maxillofacial Pathology (DEN1002S)</p> <p>Clinical Epidemiology and Evidence-Based Care (DEN1014H)</p> <p>Pharmacology of Dental Therapeutics (DEN1062H)</p> <p>Graduate Endodontics Case Presentations (DEN5001Y)</p> <p>Graduate Endodontics Topical Literature (DEN5002Y)</p> <p>Graduate Endodontics Current Literature (DEN5003Y)</p> <p>Endodontic Clinic (PDE9091Y)</p> <p>Clinical Conferences (PDE9094Y)</p> <p>Research (RST9999Y)</p> <p>Teaching (in the undergraduate preclinical endodontics course)</p>	<p>Graduate Endodontics Case Presentations (DEN5001Y)</p> <p>Graduate Endodontics Topical Literature (DEN5002Y)</p> <p>Graduate Endodontics Current Literature (DEN5003Y)</p> <p>Endodontic Clinic (PDE9091Y)</p> <p>Clinical Conferences (PDE9094Y)</p> <p>Teaching (in the undergraduate preclinical endodontics course)</p> <p>Research (RST9999Y)</p> <p> *Available in alternate years</p>	<p>Endodontic Clinic (PDE9091Y)</p> <p>Research (RST9999Y)</p> <p>Teaching (in the undergraduate preclinical endodontics course)</p>
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A curriculum map for the endodontics program can be found under Appendix 16.

## **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 & 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 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.

Year 1	Year 2	Year 3	Year 4
<p><i>First Term</i> Research Ethics (DEN1010H)</p> <p><i>First and Second Terms</i> General and Special Pathology for Residents (LMP1300Y)*</p> <p>*For M.Sc. (Oral &amp; Maxillofacial Pathology) and M.Sc. (Oral &amp; Maxillofacial Pathology and Oral Medicine) students.</p>	<p><i>First Term</i> Oral Radiology (DEN1007F) Introduction to Biostatistics (DEN1015F) Principles of Physical Examination and Diagnosis (DEN3002Y Clinical Methods)</p> <p><i>Second Term</i> Oral Pathology (DEN1002S) Clinical Epidemiology and Evidence-Based Care (DEN1014S)</p> <p><i>First and Second Terms</i> Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y)</p>	<p><i>First and Second Terms</i> Seminars in Oral Health Sciences (DEN1001Y) Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y) Research (RST9999Y)</p>	<p><i>First and Second Terms</i> Seminars in Advanced Oral Pathology (DEN1011Y) Oral Medicine (DEN1012Y) Oral Surgical Pathology (DEN1013Y) Research (RST9999Y)</p>

The following are the learning outcomes of the program (adapted from the Commission on Dental Accreditation of Canada, 2018):

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

The graduating student will be able to:

- 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;
- 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;
- diagnose and provide consultation regarding patients with diseases of the jaws that require surgical therapy;
- develop and discuss treatment plans with patients and make recommendations based on a critical review of the literature;
- 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:

- diagnose and manage patients with orofacial pain and other neurosensory disorders;
- 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;
- 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:

- 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;
- 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);

- 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;
- perform, supervise and interpret laboratory tests for the tissue diagnosis of orofacial disease; direct or co-direct Oral & Maxillofacial Pathology laboratory personnel.

A 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, next gen sequencing) and biological agents for treatment based on a better understanding of disease mechanisms. 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, the program has kept abreast with advances in diagnosis and treatment of diseases. The 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 recent graduates are 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. 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 have also set 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.

A curriculum map for the Oral and Maxillofacial Pathology and Oral Medicine programs can be found under Appendix 16.

## **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:

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 & maxillofacial 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.

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 ancillary studies, 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 summative graduate student examination follows the format of the National Dental Specialty Examination and consists of 3 components:

Individual Oral examination (panel of 2-3 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.

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.

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 capstone examination is used as summative assessment to indicate the outcome of the 4-year educational program.

## **ORAL & MAXILLOFACIAL RADIOLOGY**

### **Curriculum & 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:

- 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).
- carry out radiologic procedures including intra-oral, panoramic and skull radiography, cone beam computed tomography, and sialography.
- image process cone beam CT images, and complete appropriate analyses of these image data.
- identify normal anatomy and its variations on radiologic images.
- identify the characteristic features of developmental and congenital abnormalities, acquired diseases and trauma on radiologic images, and to provide interpretations of these conditions.
- communicate radiologic interpretations/diagnoses to colleagues in oral and written form.
- develop and undertake a research project in a basic or clinical science, or educational research area that may enhance understanding in clinical oral and maxillofacial radiology.

As well, students will gain experience supervising staff in the production of images of high diagnostic quality and in radiation hygiene; provide instruction in an undergraduate oral and maxillofacial radiology curriculum; and develop and undertake a research project in a basic or clinical science, or educational research area that may enhance understanding in clinical oral and maxillofacial radiology.

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

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 digital two- and three-dimensional imaging systems in patient care. Specifically, the Faculty operates 2 cone beam CT systems capable of capturing volumes through the craniofacial region ranging in size from 4 cm in diameter to 17 cm in diameter. 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.

A curriculum map for the Oral and Maxillofacial Radiology program can be found under Appendix 16.

## **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 capstone 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 & Program Delivery**

The objective of the program in Oral & Maxillofacial Surgery (OMS) is to train students in OMS to be competent clinicians. There is the expectation that graduates would not only become competent in the surgical techniques of OMS, but also in the biological principles of physiology, pharmacology, medicine, anatomy, pathology, surgery and other scientific areas that support and are necessary for individuals to become competent diagnosticians and evidence-based health care providers. Graduates are expected to be capable of evaluating the literature, be discriminating and 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.

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:

- the first component is 12 months in length and provides the student with an understanding of the basic surgical principles of OMS.
- the second 12-month period is spent off service in medically-surgically related disciplines. It is designed to provide the OMS student the basic medical & related surgical knowledge required to allow for comprehensive perioperative and postoperative patient care. Rotations include: trauma surgery, emergency medicine, ICU, internal medicine, head and neck cancer, craniofacial surgery and a major component of anesthesia training is undertaken.

The final 24 months of the program places OMS students 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.

Year 1	Year 2	Year 3	Year 4
<p><b>First Term</b></p> <ul style="list-style-type: none"> <li>-Principles of Surgery (Faculty of Medicine, Surgical Skills Center)</li> <li>-Anatomy (DEN 3005H)</li> <li>-Oral Radiology (DEN1007F)</li> <li>-Research Ethics (DEN1010H)</li> <li>-Oral Surgical Pathology (DEN1013Y)</li> <li>-Oral Physiology: Sensory &amp; Neuromuscular Function (DEN1060F)</li> </ul> <p><b>Second Term</b></p> <ul style="list-style-type: none"> <li>-Oral Pathology (DEN1002S)</li> <li>-Oral surgical Pathology (DEN1013Y)</li> </ul> <p><b>First and Second Terms</b></p> <ul style="list-style-type: none"> <li>-Surgical Orthodontics (DEN2005Y)</li> <li>-Craniofacial Anomalies (DEN2007Y)</li> <li>-OMFS 1 - The Physiological Basis of Disease (DEN3001Y)</li> <li>-OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y)</li> </ul>	<p><b>First and Second Terms</b></p> <ul style="list-style-type: none"> <li>-Introduction to Biostatistics (DEN1015H)</li> <li>-OMFS 1 - The Physiological Basis of Disease (DEN3001Y)</li> <li>-OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y)</li> <li>-OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y)</li> <li>-Research (RST9999Y)</li> </ul> <p><b>Second term</b></p> <ul style="list-style-type: none"> <li>-CONE Beam CT Imaging (DEN1008S)</li> </ul> <p>CLINICAL ROTATIONS:</p> <ul style="list-style-type: none"> <li>Anaesthesia: 3 months (Adult), 1 month (Pediatric);</li> <li>Internal Medicine: 2 months;</li> <li>Emergency Medicine: 1 month;</li> <li>General Surgery: 2 months;</li> <li>Otolaryngology: 2 months;</li> <li>SICU: 1 month</li> </ul>	<p><b>First and Second Terms</b></p> <ul style="list-style-type: none"> <li>-Oral Surgical Pathology (DEN1013Y)</li> <li>-Surgical Orthodontics (DEN2005Y)</li> <li>-OMFS 1 - The Physiological Basis of Disease (DEN3001Y)</li> <li>-OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y)</li> <li>-OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y)</li> <li>-OMFS 4 - Applied Surgical Anatomy of the Head and Neck (DEN3004Y)</li> <li>-Clinical Conferences (PDE9094Y)</li> <li>-Research (RST9999Y)</li> </ul>	<p><b>First and Second Terms</b></p> <ul style="list-style-type: none"> <li>-Surgical Orthodontics (DEN2005Y) [audit]</li> <li>-OMFS 1 - The Physiological Basis of Disease (DEN3001Y)</li> <li>-OMFS 2 - Principles and Practice of Oral and Maxillofacial Surgery (DEN3002Y)</li> <li>-OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y)</li> <li>-Research (RST9999Y)</li> </ul>

<ul style="list-style-type: none"> <li>-OMFS 3 - Evidence-based Literature Reviews in Oral and Maxillofacial Surgery (DEN3003Y)</li> <li>-OMFS 4 - Applied Surgical Anatomy of the Head and Neck (DEN3004Y)</li> <li>-(audit and demonstrate) Anatomy (DEN3005H)</li> <li>-Clinical Conference (PDE9094Y)</li> <li>-Research (RST9999Y)</li> </ul>			
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Clinical activities are based at Mount Sinai Hospital, Humber River Hospital, Holland Bloorview Kids Rehabilitation Hospital, the Hospital for Sick Children, and Sunnybrook Health Sciences Centre. Other affiliated University of Toronto teaching hospitals, with additional participation at Rouge Valley Health Network, Trillium Health Network, Hotel-Dieu Grace (Windsor) and Thunder Bay Regional Hospital. Continued support and teaching are provided in the OMS Graduate Clinic at the Faculty of Dentistry. This teaching clinic is a one-on-one dentoalveolar and anesthesia focus for students with expert Attendings. OMS students participate in all areas of Oral and Maxillofacial Surgery with increasing responsibilities for patient care in their senior years. Opportunity exists for students to participate in the HBKR outreach northern clinics. These occur 4 times a year with travel to remote northern communities to consult and prepare complex craniofacial anomalies.

In Year IV, electives may be arranged (to a maximum of one month) 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), the OMS program provides for 2-week coverage of surgical care at the Black Lion Hospital in Addis Ababa. This is a collaboration between TAAAC and Face the Future Foundation. The goal is teaching, learning, and working alongside OMS students of Addis Ababa University. Surgical care of complex facial deformities is provided with an emphasis on understanding 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. Advanced Cardiac Life Support (ACLS) training is to be completed prior to commencement of Year III and Advanced Trauma Life Support (ATLS) training must be completed before the end of Year IV.

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. Students 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.

A curriculum map for the Oral and Maxillofacial Surgery program can be found under Appendix 16.

## **Assessment of Learning**

OMS students are regularly evaluated during seminar participation, essays, term tests and examinations in their didactic coursework. The objectives and their assessments follow the CanMeds 2015 Framework of:

- Medical/Dental Experts
- Communicator
- Collaborator
- Leader
- Health Advocate
- Scholar
- Professional

Clinical training and progress are evaluated with regular In-Training Evaluation Reports (ITER) completed by all OMS 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 student's assigned rotation. ITERs are reviewed with the individual student in detail by each faculty member and corrective feedback provided. Currently the program works with the Post Graduate Medical Education utilizing the POWER assessment tool (Post Graduate Web Registration System).

OMS students are evaluated on monthly summaries provided by Attendings and staff via facilitated assessment Apps. Three exams are held each year to cover the DENS3001/2/3/4 course material. These exams are held the first Monday of December (written and short virtual oral examinations) and the first Monday of May (formal in-person oral examination). The third examination is the OMFS Objective Structured Assessment of Technical Skills examination. This is a world's first initiative that also involves students attending from across North America and is held at the Surgical Skills Laboratory.

OMS students are prepared for the National Dental Specialty Examination administered by the National Dental Examining Board of Canada and for the Fellowship Examination administered by the Royal College of Dentists of Canada. The students 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 students in the field of OMS. Our students 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 & Program Delivery**

The mission of the graduate program in orthodontics & 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 & dentofacial orthopedic programs as specified by the Commission on Dental Accreditation of Canada. The program's specific objectives are to provide:

- a strong educational background in science and investigatory methodology so that decisions in clinical care are evidence based and patient centered.
- research and teaching experiences that are formulated on the principles and procedures that have biologic and scientific validity.
- 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.
- high quality training in clinical orthodontic technique and mechanotherapy and to develop the clinical skills that will produce a competent clinician.
- 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 content of the graduate program in orthodontics & dentofacial orthopedics 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 or research practicum 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 optimally use contemporary technological advancements in the program.

Year 1	Year 2	Year 3
<p><i>First Term</i>            Oral Radiology (DEN1007F)            Research Ethics (DEN1010H)            Introduction to Biostatistics (DEN 1015H)            Oral Physiology: Sensory and Neuromuscular Function (DEN1060F)</p> <p><i>Second Term</i>            Clinical Epidemiology and Evidence-Based Care (DEN1014H)            Craniofacial Anatomy and Osteology (DEN2008Y)            Cone Beam CT Imaging (DEN1008S)</p> <p><i>First and Second Terms</i>            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)            Research (RST9999Y)            Clinical Conferences (PDE9094Y)</p>	<p><i>Second Term</i>            Occlusion: Function and Dysfunction (DEN1016S)*            Temporomandibular Disorders (DEN1017S)*</p> <p><i>First and Second Terms</i>            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)</p> <p>*Offered in alternating years.</p>	<p><i>Second Term</i>            Occlusion: Function and Dysfunction (DEN1016S)*            Temporomandibular Disorders (DEN1017S)*</p> <p><i>First and Second Terms</i>            Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y)            Orthodontics 3 – Ortho Tech &amp; Clin Prac (DEN2003Y)            Orthodontics 4 – Interceptive Ortho (DEN2004Y)            Surgical Orthodontics (DEN2005Y)            Craniofacial Anomalies (DEN2007Y)*            Clinical Conferences (PDE9094Y) Research (RST9999Y)</p> <p>*Offered in alternating years.</p>

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 of Dentistry 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 continuing 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.

A curriculum map for the Orthodontic and Dentofacial Orthopedics program can be found under Appendix 16.

## **Assessment of Learning**

Graduate students are assessed throughout their period of study in the 3 years of their enrolment 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 clinical coordinator, following which students receive an overall clinical grade. 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 currently



administered by the National Dental Examining Board of Canada and those who wish to become Fellows of the Royal College of Dentists of Canada are eligible to sit the Fellowship Examination conducted by the Royal College of Dentists of Canada. The very high success rate of students in these examinations clearly demonstrates the attainment of the program's learning objectives.

## **PEDIATRIC DENTISTRY**

### **Curriculum & 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 a number of community-based clinical sites. The program continues to strengthen and diversify its research mandate following an External Review (February, 2016) through new collaborative projects partnering with disciplines outside of, but relevant to pediatric dentistry.

The Pediatric Dentistry Graduate Program is a 36-month, CDAC-accredited program leading to an M.Sc. degree awarded by the School of Graduate Studies. The program meets all the educational requirements mandated for specialty certification 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 3 to 4 new students into the first-year class. Subject to patient load & clinic availability, the program also accepts one student each year for its dental specialty assessment and training (DSATP) program. The most recent DSATP candidate successfully completed our program in 2020.

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 based at three primary locations: a) Faculty of Dentistry in the Children's Clinic for chairside management and the Pediatric Surgicentre for oral moderate sedation clinic and comprehensive dental rehabilitation under general anaesthesia; b) The Hospital for Sick Children and c) Mount Sinai Hospital for the assessment and treatment of adults with special health care needs. When accessible, the graduate students also participate in rotations to Holland Bloorview Kids Rehabilitation Hospital and City of Toronto Public Health Clinics.



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:

- foundational sciences
- pharmacological and non-pharmacological child behavior management
- oral diagnosis and treatment planning
- caries prevention and risk assessment
- oral/facial growth and development and orthodontics
- oro-facial trauma
- pediatric medicine & hospital dentistry
- care of patients with special health care needs
- communication with health care professionals, professional development, ethics, advocacy and leadership

Year 1	Year 2	Year 3
<p><i>First Term</i> Oral Radiology (DEN1007F) Research Ethics (DEN1010H) Biostatistics (DEN 1015H) Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H)</p> <p><i>Second Term</i> Oral Pathology (DEN1002S) Clinical Epidemiology and Evidence-Based Care (DEN1014H) Pharmacology of Dental Therapeutics (DEN1062H) [Audit] Craniofacial Anomalies* (DEN2007Y)</p> <p><i>First and Second Terms</i> 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 Trauma &amp; Endodontics (DEN4007H) Pediatric Dentistry 8 – Conscious Sedation and Anaesthesia in Pediatric Dentistry (DEN4011Y)</p>	<p><i>First and Second Terms</i> Clinical Conferences (PDE9094Y)</p> <p><i>First, Second and Third Terms</i> Pediatric Dentistry 1 – Theory (DEN4001Y – includes a module on **Practice Management) Pediatric Dentistry 2 – Journal Review (DEN4002Y) Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y – phasing out in 2022; in 2021-22 replaced by Clinical Pediatric Dentistry II - DEN4013Y) Pediatric Orthodontics (DEN4008Y) Research (RST9999Y)</p>	<p><i>First, Second and Third Term</i> Seminars in Oral Health Sciences (DEN1001Y) Pediatric Dentistry 1 – Theory (DEN4001Y – includes a module on **Practice Management) Pediatric Dentistry 2 – Journal Review (DEN4002Y) Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y – phasing out in 2022; in 2022-23 replaced by Clinical Pediatric Dentistry III - DEN4014Y) Pediatric Orthodontics (DEN4008Y) Research (RST9999Y)</p> <p><i>**Second Term</i> Advances in Dental Biomaterials (DEN1070H) <i>**given on alternate years to the Year 2 &amp; 3 graduate students</i></p>

<p>Pediatric Dentistry 9 – Pediatric Medicine &amp; Hospital Dentistry (DEN4010Y)  Pediatric Orthodontics (DEN4008Y)  Clinical Conferences (PDE9094Y)</p> <p><i>First, Second and Third Terms</i>  Pediatric Dentistry 1 – Theory (DEN4001Y- includes modules on Speech Therapy, Pediatric Oral Pathology)  Pediatric Dentistry 2 – Journal Review (DEN4002Y)  Pediatric Dentistry 5 – Clinical Pediatric Dentistry (DEN4005Y – phasing out in 2022; in 2020-21 replaced by Clinical Pediatric Dentistry I - DEN4012Y)  Research (RST9999Y)</p> <p>*Offered in alternating years.</p>		
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In late 2018, Dr. Karen Campbell accepted a faculty position and assumed the role of program director. She was the former program director for the graduate program in Pediatric Dentistry at the University of British Columbia and Chief of Dentistry at BC Children’s Hospital in Vancouver.

In January 2019, the program’s accreditation status with CDAC was successfully reviewed and renewed.

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, biomaterials, craniofacial anomalies, cleft lip and palate, and Seminars in Oral Health Sciences. Specialty courses pertaining to all aspects of pediatric dentistry are provided by pediatric dentistry Faculty and span all 3 years. Graduate students also attend weekly hospital rounds at SickKids Hospital.

Graduate students are required to undertake a research project which they must defend for their M.Sc. degree. During the 36-month program, students are provided with the equivalent of 14 non-consecutive months of protected time for independent study/research. The program has shifted its research focus to new interdisciplinary collaboration in the areas of biomaterials, dental education, dental public health, dental anaesthesia, and pharmacology most recently.

In 2020, Dr. Campbell convened a committee of seven of the program’s faculty (including a graduate student representative) to undertake a comprehensive curriculum review, which is on-going. A set of “entrustable professional activities” (EPAs) has been developed which

will reframe the clinical training program. Next steps include establishing the formal assessment process for these EPAs; each will have a designated level of supervision to be achieved for graduation. The didactic curriculum will be re-mapped to support these new EPAs, eliminate redundant course content and augment existing programming as required.

The program continues to add to its complement of FTE faculty to support continued transformation of the program. In 2020 (and extending into 2021) we will welcome three additional faculty in pediatric dentistry, including one of our excellent graduates. One of this program's strengths is the engagement and active involvement of its program alumni to provide teaching support for the program.

A curriculum map for the Pediatric Dentistry program can be found under Appendix 16.

## **Assessment of Learning**

All graduating students sit the National Dental Specialty Examination in Pediatric Dentistry offered by the National Dental Examining Board of Canada in their final program year and to date, all students have been successful. As of 2020, the Fellowship examination in Pediatric Dentistry offered by the Royal College of Dentists of Canada (RCDC) has become optional (as is the American Board of Pediatric Dentistry Qualifying Examination) but our graduates have will all pursue the RCDC Fellowship in 2021. For the M.Sc. research component, the time-to-completion for our graduate students has improved in the last two years.

## **PERIODONTICS**

### **Curriculum & 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 Ph.D.

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 2016, we have graduated 17 M.Sc. students.

The program allocates dedicated time for research so that the students can completed their thesis in a timely manner. First year is mainly focused on research while the second and third

year of the M.Sc. is dedicated to clinical training and hospital rotations. As a result, since 2016, 95% of the students have completed both their research and clinical requirements in a timely manner.

The amount and depth of clinical training is extremely robust. The students have significant exposure to periodontitis cases. Each student treats over 150 cases of periodontitis that requires a wide range of nonsurgical and surgical treatments and over 30 periodontal plastic cases. Upon graduation, the students 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 dental implant surgery, and achieve competency treating cases that require alveolar bone ridge augmentation, sinus lift procedures and restoration of implants. The prosthetic aspect has maintained its strength over the last five years with close involvement of our students with prosthodontists. The clinical experience in the Implant Prosthodontic Unit (IPU) has also continued to improve 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.

Periodontics graduate students also have significant experience in the hospital setting where they are exposed to oral pathoses at Mount Sinai Hospital and cancer-related pathoses at Princess Margaret Hospital. They also gain clinical experience in management of patients with temporomandibular disease-related pain and facial pain through the Mount Sinai Hospital. Advanced research is also being performed in the refractory and peri-implantitis clinics at the Mount Sinai Hospital. The senior graduate students rotate through these clinics and gain experience in management of refractory and peri-implantitis cases.

Year 1	Year 2	Year 3
<p><i>First Term</i>            Research Ethics (DEN1010H)            Inhalation and Oral Minimal and Moderate Sedation for Dental Procedures (DEN1090H) Oral and Maxillofacial Radiology (DEN1007F)            Introduction to Biostatistics (DEN1015H)</p> <p><i>Second Term</i>            Clinical Epidemiology and Evidence-Based Care (DEN1014H)            Cone Beam CT Imaging (DEN1008S)            Advances in Dental Materials Sciences (DEN1070H)*</p> <p><i>First and Second Terms</i>            Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y)            Periodontology – Seminars and Clinics I</p>	<p><i>First Term</i>            Investigating Pathogenic Biofilms (DEN1022F)</p> <p><i>Second Term</i>            Oral Pathology (DEN1002S)            Advances in Dental Materials Sciences (DEN1070H)* (if not taken in year 1)</p> <p><i>First and Second Terms</i>            Parenteral Moderate Sedation for Dental Procedures (DEN1091Y)            Seminars in Oral Health Sciences (DEN1001Y/DEN1100Y)            Periodontology – Seminars and Clinics II (DEN1034Y)            Literature Review in Periodontology (DEN1036Y)            Clinical Case Presentations (DEN1037Y)</p>	<p><i>First and Second Terms</i>            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)</p>

(DEN1033Y) Literature Review in Periodontology (DEN1036Y) Principles and Practice of Periodontology (DEN1039Y) Research (RST9999Y)  *Offered in alternating years.	Biomaterials and Implant/Reconstructive Dentistry (DEN1038Y) Principles and Practice of Periodontology (DEN1039Y) Clinical Conferences (PDE9094Y) Research (RST9999Y)  *Offered in alternating years.	Research (RST9999Y) Elective Graduate Courses Other courses may be arranged
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A curriculum map for the periodontics program can be found under Appendix 16.

## **Assessment of Learning**

The students are required to maintain a procedural logbook that documents their clinical experience. The logbook documents a student’s breadth of clinical experiences. In addition, the students 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 individually meetings between the program director and each student two times per year.

The students undergo five formative oral examinations where clinical cases are used to evaluate diagnostic and therapeutic skills. Third year students also receive a summative oral examination on clinical cases. Achievement of clinical competency is determined by the procedural logbook, FITERs and successful passing of the summative examination on clinical cases.

## **PROSTHODONTICS**

### **Curriculum & 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 three 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 challenge the National Dental Specialty Examination (NDSE) in prosthodontics.

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:

- attract, develop, and retain the best people (students, clinicians, administrators, educators, and researchers);
- demonstrate quality, excellence, and continued advancement in service to patients, education, and research;
- generate financial strength to support our mission and the mission of the Faculty;
- expose the students to a diversity of clinical situations and critical concepts that constantly test and expand the limits of the students' knowledge and critical thinking skills;
- create an educational and working environment that is positive, professional, and productive;
- attain and maintain 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:

- the biological and psychological impact of the medical and dental conditions on the person;
- the value of the patient-doctor relationship;
- the biologic and technical cost inherent in most interventions;
- the value of seeking interventions that are reversible, minimally invasive, and financially prudent;
- the need for prosthodontically-driven treatment planning including prosthodontically-driven implant placement;
- the value of clinical precision, minimal tissue trauma, and laboratory excellence;
- the value of long-term follow-up;
- 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:

- prepare highly competent clinicians to practice all facets of prosthodontics and allied disciplines;
- prepare future leaders in prosthodontics who are equally able to lead in clinical practice, academic setting, or organized dentistry;
- 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;
- educate students to achieve competence to:
  - 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;
  - treatment plan diverse fixed, removable and implant-based prostheses and other interventions;
  - become independent in assessing, diagnosing, and formulating a valid and coherent treatment sequence;
  - obtain and maintain informed consent;
  - select and carry out case-specific prosthodontic, surgical, and laboratory procedures in support of the agreed upon treatment plan;
  - 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;
  - apply knowledge gained in the basic sciences, prosthodontic literature, evidence-based dentistry, allied dental specialty fields and ethics to the practice of prosthodontics;
  - develop superior communication skills with patients, referring professionals, and professional organizations;
  - liaise with allied dental health professionals and medical professionals;
  - know the limits of their knowledge and skills;
  - 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 clinical presentations 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 & maxillofacial surgery, periodontics and orthodontics. All patient care in the graduate prosthodontics program must meet a 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.

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

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 pediatric patients with prosthodontic needs at the Holland Bloorview Rehabilitation Hospital, care of prosthodontic patients with maxillofacial needs at the

Princess Margaret Hospital, and care of prosthodontic patients with significant medical complications 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 (Avivi-Arber), biomaterials (Finer, Shokati), maxillofacial (Somogyi-Ganss), Sjögren (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.

A curriculum map for the prosthodontics program can be found under Appendix 16.

## **Assessment of Learning**

Assessment of students includes their performance in the clinical, didactic, and research areas of the program. Clinical performance is assessed through daily chairside evaluations and feedback (formative assessment), weekly one-on-one sessions, formal twice-yearly written feedback from the clinical instructors (summative assessment) and twice-yearly in-depth patient group review. Didactic performance is assessed through presentations, written submissions, poster presentations, tests, course exams, bi-annual oral exams, and during weekly one-on-one sessions.

## **Quality Enhancement**

M.Sc. (Clinical Specialty) and Ph.D. (Clinical Specialty) programs are accredited every 7 years by the Commission on Dental Accreditation of Canada (CDAC). A report is submitted by the director of each specialty program to the Commission in the fall of the year in which the program is being accredited, and this is followed by a site visit, typically in the winter of that academic year. Due to administrative issues CDAC was facing at the time, we hosted 2 CDAC

accreditation visits; one in January 2019 and a second in January 2020. In follow-up to each site visit, each clinical specialty program receives a written report with global and/or specialty-specific recommendations and suggestions. The Faculty and/or program are bound to respond and implement recommendations made by the accreditation team.

During the 2019 and 2020 accreditations, the graduate programs all received Full Accreditation with annual reporting requirements to inform the Commission on interval progress on recommendations. In this cycle, the Faculty received the following global recommendations which were responded to by the associate dean, graduate education:

Recommendation 1: That all Graduate courses use the University of Toronto course syllabus template provided by the Centre for Teaching Support and ensure both the calendar description and learning objectives match what is taught to, and expected of residents at each of these stages of their learning (Requirement 2.2.2).

For the 2019 CDAC Accreditation, a standardized course syllabus developed in-house by the vice-dean, education was modified for graduate courses. Course directors were provided with this template; however, some chose not to complete the document as thoroughly as required. As part of the Faculty's Professional Development Committee, we will offer faculty more direct guidance in the development of an effective course syllabus, and the associate dean, graduate education will work with the vice-dean, education to ensure better compliance with completion of the standardized syllabus form. As well, the associate dean, graduate education has examined the "Developing Course Syllabi" document from the Centre for Teaching Support and Innovation to identify elements that may be missing from our in-house document so that we may develop a more comprehensive template for graduate courses: <https://teaching.utoronto.ca/wp-content/uploads/2020/08/Developing-Course-Syllabi-2020.pdf>

Recommendation 2: That the associate dean, graduate education, in consultation with the graduate specialty program directors, develop a documented process which ensures regular curriculum review (Requirement 2.2.2.).

Meetings were held with the graduate specialty program directors to develop a documented process to ensure regular curriculum review. The results of these discussions were brought to the Graduate Education Committee at their January 18, 2021 meeting. The Committee determined that the curriculum review would occur in the middle of the 7-year accreditation cycle. As well, this review would also allow us to check that all course outlines are completed to the satisfaction of the associate dean, graduate education. The review would be done internally, with the recommendations non-binding (advisory only) and kept confidential.

The report from the reviewers would go to the associate dean, graduate education and to the Graduate Education Committee.

Recommendation 3: That the associate dean of Graduate Studies, in collaboration with graduate specialty program directors, develop a first-year course for Specialty residents that teaches the principles of scientific writing (including use of reference managers) and hypothesis generation/development of a good research question (Requirement 2. 3. 19).

We have been in discussions with professor Laurent Bozec, the course director for DEN 1010Y/1100Y (Oral Health Science Seminars). We are working on revising this currently student-directed course, and have plans to add content early in the academic year so that incoming first year students who may have had little or no prior research training can benefit from this. It is likely that the revised course will be in place for the 2022/2023 academic year given the timeline for governance requirements for course content changes.

## **Graduate Program Considerations: Challenges, Successes & Opportunities**

In comparison with our M.Sc. program enrolment, Ph.D. program enrolments have been generally low. For what was until recently the Ph.D. (Dentistry) program, we felt that prospective applicants were under the mistaken impression that they were required to be dentists before applying, and we believe this impacted the applications we received from prospective students who were not dentists, but who were interested in undertaking research with our faculty. During the 2020/21 academic year, the graduate department, working with the Vice-Provost, Academic Programs, and School of Graduate Studies undertook an update to our program offerings, including a name change from “Dentistry” to “Dental Biomedical Sciences”, for the degree programs that do not include concurrent clinical specialty training, to better reflect the type and scope of research undertaken in the Faculty. As well, we have completed recent updates of our website and have produced paper pamphlets with more detailed wording about the different program streams and who is eligible to apply. We hope that this combination of actions will disarticulate the practice or the profession of Dentistry from the research that is done as a part of the Ph.D. (dental biomedical sciences) program, and we may see greater interest in the future. With respect to the Ph.D. (clinical specialty) programs, registration has always been low, likely because of the lengthy time commitment (up to 7 years) required to complete both the Ph.D. degree and the clinical training. Given that students applying to this program may have already completed 7 to 8 years at university as an undergraduate and then as a D.D.S. student, the additional time commitment is seen as being unnecessary, particularly if the goal of an applicant is to become a dental specialist in community practice; something achievable with an M.Sc. degree. At this time, we have enrolled a small cohort of students into these combined programs who see a future for themselves as academic clinician-scientists (3 in dental public

health, 2 in oral & maxillofacial surgery and 1 in pediatric dentistry). Many Canadian specialist clinician-scientists have trained at the University of Toronto, and we continue to see the training of academic specialist clinician-scientists as an important part of our Faculty's academic mandate.

Tables 4.6 and 4.7 summarize the offers and acceptance rates, and registrants for all M.Sc. and Ph.D. programs.

**Table 4.6: Offer & Acceptance in the M.Sc. Programs**

	2015-16		2016-17		2017-18		2018-19		2019-20	
	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept
<b>Dental Biomedical Sci.</b>	18.5 %	80.0%	47.8%	90.9%	20.8%	20.0%	25.0%	66.7%	25.6%	70.0%
<b>Clinical Specialty</b>	17.5%	80.0%	15.2%	73.5%	13.7%	78.1%	11.8%	82.1%	17.4%	61.8%
<b>Div. IV Life Sci.</b>	40.9%	62.3%	36.6%	65.1%	35.7%	63.2%	35.5%	59.2%	37.8%	59.3%
<b>UofT</b>	30.2%	59.2%	29.6%	61.8%	26.9%	62.2%	26.6%	58.8%	23.7%	59.8%

**Table 4.7: Offers & Acceptances all Ph.D. Programs**

	2015-16		2016-17		2017-18		2018-19		2019-20	
	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept	Offer	Accept
<b>Dental Biomedical Sci.</b>	9.1%	100.0%	20.0%	100.0%	14.3%	100.0%	-	-	25.0%	100.0%
<b>Clinical Specialty</b>	8.3%	0.0%	5.6%	100.0%	0.0%	0.0%	-	-	5.3%	0.0%
<b>Div. IV Life Sci.</b>	37.6%	66.8%	34.7%	72.8%	35.9%	69.3%	39.8%	68.9%	39.8%	70.6%
<b>UofT</b>	25.7%	62.7%	23.7%	67.7%	22.0%	66.5%	24.4%	68.2%	23.5%	66.9%

Tables 4.8 and 4.9 show the mean times to completion for all M.Sc. and Ph.D. programs . The mean times to completion for graduate department of 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 4.11).

**Table 4.8: Mean Times to Completion for M.Sc. Programs in years (Normal program length)**

	DBS (2.0)	Anaes (3.0)	DPH (2.0)	Endo (3.0)	OMS (4.0)	OMPOM (4.0)	OMR (3.0)	Ortho (3.0)	Pediat (3.0)	Perio (3.0)	Prosth (3.0)
<b>2015-16</b>	4.0	3.0	2.1	3.0	4.3	4.0	3.0	3.0	4.3	3.4	3.2
<b>2016-17</b>	3.0	3.2	-	3.3	4.3	-	3.0	3.3	3.8	3.3	3.0
<b>2017-18</b>	2.9	3.2	-	3.3	4.3	-	3.0	3.3	3.3	3.1	4.0
<b>2018-19</b>	2.3	3.0	2.9	3.3	---	4.3	3.0	3.3	3.6	3.3	3.0
<b>2019-20</b>	3.0	3.0	2.8	3.3	4.3	4.0	3.0	3.3	3.7	4.2	4.7

DBS, Dental Biomedical Sciences  
 Anaes, Dental Anaesthesiology  
 DPH, Dental Public Health  
 Endo, Endodontics

OMS, Oral and Maxillofacial Surgery  
 OMPOM, Oral and Maxillofacial Pathology and Oral Medicine  
 OMR, Oral and Maxillofacial Radiology  
 Ortho, Orthodontics and Dentofacial Orthopedics  
 Pediat, Pediatric Dentistry  
 Perio, Periodontics  
 Prosth, Prosthodontics

**Table 4.9: Mean Time to Completion for Ph.D. Programs in years (Normal program length)**

	DBS (5.0)	Anaes	DPH (5.0)	Endo	OMS	OMPOM	OMR	Ortho	Pediat	Perio	Prosth
<b>2015-16</b>	5.5	-	4.0	-	-	-	-	-	-	-	-
<b>2016-17</b>	5.1	-	-	-	-	-	-	-	-	-	-
<b>2017-18</b>	6.1	-	-	-	-	-	-	-	-	-	-
<b>2018-19</b>	4.5	-	-	-	-	-	-	-	-	-	-
<b>2019-20</b>	5.3	-	-	-	-	-	-	-	-	-	-

As a requirement for licensure for the nationally-recognized dental specialists in Canada, graduates of dental specialty programs are required to pass a national dental specialty examination (NDSE) in their field of specialization. Graduates of the Dental Anaesthesia graduate program challenge the diplomate examination of the American Dental Board of Anesthesiology as a requirement for specialist licensure in the Province of Ontario.

Between the years 2015 and 2019, the national dental specialty examinations were administered by the Royal College of Dentistry of Canada (RCDC). The 5-year rolling first time pass rates for University of Toronto students for the American Dental Board of Anesthesiology and the NDSEs are summarized in Table 4.10 below, and the data is broken down by specialty. This data was obtained from the Royal College of Dentistry of Canada and program directors.

**Table 4.10: Rolling 5-year first time pass rates for University of Toronto students challenging the National Dental Specialty Examinations administered by the Royal College of Dentists of Canada and the American Dental Board of Anesthesiology examinations**

	Total number of candidates	First time pass
Dental Anaesthesia (American Dental Board of Anesthesiology)	10	9
Dental Public Health	10	8
Endodontics	11	11
Oral and Maxillofacial Pathology and/or Oral Medicine	4	4
Oral and Maxillofacial Radiology	6	5
Oral and Maxillofacial Surgery	10	7
Orthodontics and Dentofacial Orthopedics	27	25
Pediatric Dentistry	11	11
Periodontics	16	16
Prosthodontics	11	9
<b>Total</b>	<b>116</b>	<b>105</b>

Table 4.10 demonstrates an overall first time pass rate of 91% for our dental specialty students in certifying examinations. A subset of students who challenge the NDSE may also challenge the American Board examinations in some of the specialties, although this is sporadic as the American credential is not a requirement for Canadian graduates. For those who do, in specialties such as Oral and Maxillofacial Radiology and Pediatric Dentistry, we understand from these program directors that the first time pass rates for these test takers is 100%.

**Table 4.11: Mean Times to Completion for all M.Sc. & Ph.D. Programs (in years) benchmarked with Life Sciences graduate programs and all programs at the University of Toronto**

Graduation Year	Dentistry		Life Sciences		All UofT	
	M.Sc.	Ph.D.	M.Sc.	Ph.D.	M.Sc.	Ph.D.
2015-16	3.4	5.6	2.3	5.7	1.7	5.9
2016-17	3.5	5.1	2.2	5.8	1.7	6.0
2017-18	3.3	6.1	2.2	5.8	1.7	6.0
2018-19	3.2	4.8	2.2	5.9	1.7	6.1
2019-20	3.6	5.4	2.2	5.9	1.8	6.0

Data from the Canadian Graduate & Professional Student Survey (CGPSS) shows higher satisfaction compared with U15 Dentistry graduate programs with respect to benchmarks for these selected metrics (Table 4.12). The complete dataset can be found in Appendix 17.

**Table 4.12: Student Satisfaction M.Sc. & Ph.D. Students (2019 CGPSS data)**

	UofT Dentistry	U15 Dentistry	UofT All Disciplines
Quality of Teaching	3.66	3.65	3.85
Research Training & Career Orientation	3.03	2.88	2.95
Supportive Dissertation Advisor	3.35	3.19	3.33
Overall Quality of the Graduate Program	3.39	3.37	3.73

(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 4.13).

**Table 4.13: Responses to "Overall, how would you rate the quality of your [M.Sc. or Ph.D.] graduate program at the University?" (2019 CGPSS data)**

	Dentistry % (n)	Life Science % (n)	UofT All Disciplines % (n)
Excellent	21.7% (23)	25.0% (1078)	23.3% (2798)
Very Good	26.1%	39.8%	38.6%
Good	26.1%	23.9%	25.8%
Fair	13.0%	8.4%	8.9%



Poor	13.0%	8.9%	3.4%
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The complete dataset from the CGPSS may be found in Appendix 17.

Identifying funding to support clinical specialty practice and clinical research continues to be challenging in the current environment. Although we continue to work closely through our Advancement office with vendors and donors for new equipment, the purchase of new technologies in the dental specialties continues to be a challenge given the budgetary constraints on the Faculty in recent years.

There is a need to identify sources of research funding for those graduate specialty students who wish to conduct clinical research as part of their thesis work. As clinical research is not well-supported or recognized by some funding agencies in dentistry, some students have successfully won funding through some (mostly) American dental specialty organizations who have Foundations to support clinical research. This support is, however, heterogeneous across the different specialties.

A major 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. In some of these newer programs (some of which may also be hospital-based), students may not be required to complete a graduate M.Sc. or Ph.D. degree together with their clinical training, and they may be offered a stipend that is similar to the one received by medical residents in training, which puts our specialty programs at a disadvantage.

In recent years, some of our graduate students (including those involved with clinical specialty training who do not receive a guaranteed funding package through the University) have received external funding from the provincial Ontario Graduate (7 awards per year) and the Queen Elizabeth II Scholarship (2 awards per year) programs. Our students have also been successful in the Canadian Graduate Scholarships competition at the Doctoral (3 awards between 2015 and 2019) and Masters (2 awards between 2015 and 2019) levels through the Canadian Institutes for Health Research and the Natural Sciences and Engineering Research Council of Canada. Competitive awards like these help offset funding commitments from principal investigators and the graduate department, and some of these awards provide stipends of greater value than the guaranteed funding packages for graduate students in the funded cohort. These award amounts are particularly noteworthy, as the cost of living in the Greater Toronto Area is high, potentially discouraging students from studying at the University of Toronto. As a result, students may also choose graduate programs located in less costly centres in Canada and the United States.

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 and attract competitive research funding. As faculty members are responsible, in part, for providing partial stipend/tuition and research support for M.Sc./Ph.D. (dental biomedical sciences) students and research support for clinical specialty students, financial resources often limit the numbers of graduate students a faculty member may accept for supervision, particularly as grant funding from the Canadian Tri-Council agencies becomes increasingly more competitive. The recruitment and retention of qualified full-time faculty with both research and clinical specialty credentials continues to be a challenge. A major confounder continues to be the significant gap between private practice income for dentists/dental specialists, and academic salaries. As a result, the didactic and clinical components of some graduate program are largely delivered by part-time clinical instructors who may have philosophies of care that differ from those of the full-time faculty. In comparisons with some larger U.S. dental schools where much of the didactic and clinical teaching is undertaken by full time faculty members, many Canadian schools do not have the financial resources to increase full time equivalent personnel to permit this model of education.

## **Co- or Extracurricular Opportunities**

At the university, students are able to enroll in one of the collaborative specializations together with their M.Sc. or Ph.D. degrees. The graduate department of Dentistry is a member of the following University Collaborative Specializations: aging, palliative & supportive care across life course; biomedical engineering; cardiovascular sciences; global health; musculoskeletal sciences; and neuroscience. The collaborative specializations, which typically require added coursework in the form of Full Course Equivalents of registration give students broader exposure to a particular field in the biomedical sciences as well as learning opportunities associated with the collaborative specializations.

## **Assessment of the Program Relative to Best of its Kind Offered in Canada, North America, & Internationally**

The University of Toronto Faculty of Dentistry 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 Australia, Brazil, the People's Republic of China, Egypt, Greece, Hungary, India, Iran, Iraq, Jamaica, Kuwait, Mexico, the Peoples' Republic of China, Taiwan and Saudi Arabia into its M.Sc. and Ph.D. programs. While some international students have returned to work in their home countries as community practitioners or university faculty members, many have remained in Canada in similar roles.

Internationally, as stated elsewhere in this document, in 2021 the University of Toronto Faculty of Dentistry ranked 38th in the QS ranking and 25th in the Shanghai Ranking.

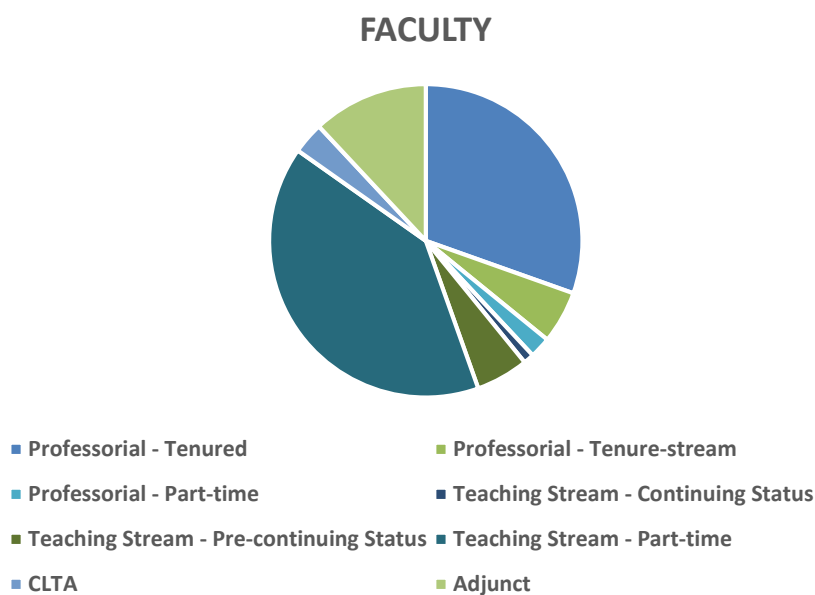
## **5. FACULTY**

## Overview

The Faculty has a total complement of 69.32 Full Time Equivalents (FTE) for 2021-22. This is a decrease when compared to the past number of years, such as 2013-14, when we had 73.6 FTE. In spite of a 35% increase in D.D.S. enrolment that same year, a gradual decrease in overall FTE has been implemented in an effort to partially address the Faculty's financial challenges.

The full-time complement is comprised of 42 full-time faculty of whom 28 are tenured, 5 pre-tenure (3 of whom are having their tenure review in 2021-22), one who has continuing status in the teaching stream, 5 who are pre-continuing status teaching stream (one of which is going for continuing status review in fall of 2021), and 3 who are on contractually limited term appointments (CLTA). The faculty curriculum vitae are included in Appendix 19.

**Table 5.1: Faculty Complement**



**TABLE 5.2: Full-time Faculty**

Surname	First name	RANK as of July 1, 2021
BRADLEY	GRACE	Professor
CVITKOVITCH	DENNIS	Professor
DEPORTER	DOUGLAS	Professor
FINER	YOAV	Professor
GANSS	BERNHARD	Professor
GLOGAUER	MICHAEL	Professor
KISHEN	ANIL	Professor
LAM	ERNEST	Professor

MANOLSON	MORRIS	Professor
MCCULLOCH	CHRISTOPHER	Professor
QUINONEZ	CARLOS	Professor
SURI	SUNJAY	Professor
TENENBAUM	HOWARD	Professor
DAVIES	JOHN	Professor
SANTERRE	PAUL	Professor
TAM	LAURA	Professor, CLTA
LAI	JIM YUAN	Professor, Teaching Stream
AVIVI-ARBER	LIMOR	Associate Professor
AZARPAZHOOH	AMIR	Associate Professor
BASRANI	BETTINA	Associate Professor
BOZEC	LAURENT	Associate Professor
DE SOUZA	GRACE	Associate Professor
DEMPSTER	LAURA	Associate Professor
GONG	SIEW-GING	Associate Professor
KULKARNI	GAJANAN	Associate Professor
LAWRENCE	HERENIA	Associate Professor
LEVESQUE	CELINE	Associate Professor
MORIARTY	TARA	Associate Professor
NAINAR	HASHIM	Associate Professor
PRAKKI	ANURADHA	Associate Professor
CARNEIRO	KARINA	Assistant Professor
CIOFFI	IACOPO	Assistant Professor
MAGALHAES	MARCO	Assistant Professor
MOAYEDI	MASSIEH	Assistant Professor
SHRESTHA	ANNIE	Assistant Professor
CAMINITI	MARCO	Assistant Professor, Teaching Stream
MENDES	VANESSA	Assistant Professor, Teaching Stream
POSLUNS	JAMES	Assistant Professor, Teaching Stream
SOMOGYI-GANSS	ESZTER	Assistant Professor, Teaching Stream
WONG	MICHELLE	Assistant Professor, Teaching Stream
BURGESS	KAREN	Assistant Professor, CLTA
RAYMAN	RICHARD	Assistant Professor, CLTA

There are 40 part-time faculty in the teaching stream, 1 part-time tenured faculty member, and 2 that are in the professorial non-tenured stream. The part-time policy at the University of Toronto changed in 2021 to allow part-time faculty to apply to be in the teaching stream. Most part-time faculty elected to switch to this stream, as it more appropriately reflected their workload commitment. Another change in direction was an attempt to reduce the proportion of smaller part-time appointments. In recent years we have aimed to have a minimum commitment of 0.4 FTE for any new part-time appointment.

There are 10 adjunct professors and one adjunct lecturer. Regarding status-only appointments, as of July 1, 2021, there are 14 assistant professors, 6 associate professors, 4 full professors, and 63 at the rank of instructor in dentistry. As well, there are approximately 500 instructors in dentistry who are primarily clinical or pre-clinical laboratory instructors,

who make a major contribution to our teaching in both the undergraduate and graduate programs.

**TABLE 5.3. Part-time Faculty**

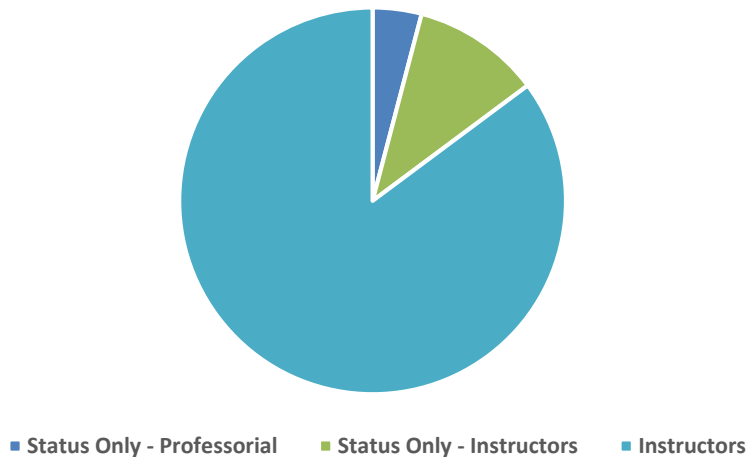
Surname	First Name	Rank (As of July 1, 2021)	FTE %
Anderson	Greg	Assistant Professor, Teaching Stream	75
Andrews	Paul	Assistant Professor, Teaching Stream	40
Arat	Emel	Assistant Professor, Teaching Stream	25
Barlow	William	Assistant Professor, Teaching Stream	50
Black	Riva	Assistant Professor, Teaching Stream	30
Blanas	Nick	Assistant Professor, Teaching Stream	50
Campbell	Karen	Associate Professor, Teaching Stream	60
Cash	Mindy	Assistant Professor, Teaching Stream	50
Cherkas	Pavel	Assistant Professor, Teaching Stream	70
Chow	Susanna	Assistant Professor, Teaching Stream	50
Chugh	Deepika	Assistant Professor, Teaching Stream	75
Chvartzaid	David	Assistant Professor, Teaching Stream	75
Clarke	Martha	Assistant Professor, Teaching Stream	75
Cornell	David	Assistant Professor, Teaching Stream	75
Cuddy	Karl	Assistant Professor, Teaching Stream	50
Daskalogiannakis	I. John	Associate Professor, Teaching Stream	25
Dosani	Fehmida	Assistant Professor, Teaching Stream	50
Goldberg	Michael	Associate Professor, Teaching Stream	70
Huang	Bo	Assistant Professor	60
Katsikeris	Nikolaos	Assistant Professor, Teaching Stream	75
Lanca	A. Jose	Assistant Professor, Teaching Stream	50
Leong	Iona	Associate Professor, Teaching Stream	50
Leung	Beatrice	Assistant Professor, Teaching Stream	40
MacMillan	Roxanna	Assistant Professor, Teaching Stream	40
Malkhassian	Gevik	Assistant Professor, Teaching Stream	50
Naderiani	Larisa	Assistant Professor, Teaching Stream	40
Nargaski	Natoosha	Assistant Professor, Teaching Stream	60
Nkansah	Peter	Assistant Professor, Teaching Stream	25
Ouanounou	Aviv	Associate Professor, Teaching Stream	60
Oxner	Jill	Assistant Professor, Teaching Stream	50
Perschbacher	Susanne	Assistant Professor, Teaching Stream	50
Perschbacher	Kristina	Assistant Professor, Teaching Stream	40



Rosenbloom	Joel	Assistant Professor, Teaching Stream	60
Sectakof	Pavel	Assistant Professor, Teaching Stream	20
Sessle	Barry	Professor	60
Sharma Fung	Khushee	Assistant Professor, Teaching Stream	50
Shokati	Babak	Assistant Professor, Teaching Stream	40
Singhal	Sonica	Assistant Professor, CLTA	40
Tenn-Lyn	Nicole	Assistant Professor, Teaching Stream	20
Yarascavitch	Carilynne	Assistant Professor, Teaching Stream	60

**Table 5.4: Status Only & Instructors in Dentistry Complement**

### Status Only & Instructors



## Strengths

The Faculty is fortunate in a number of ways. We have a complement of academics with strengths in research and strengths in teaching. Our faculty members have won numerous awards and honours (see Appendix 8). In spite of the challenges listed below, we have been able to continue to recruit junior faculty with excellent potential. We will also continue to rely on the invaluable contributions of our Instructors in Dentistry, who are essential to our teaching in both the undergraduate and graduate programs. The vast majority of these Instructors are dentists or dental specialists with practice experience who come to the school on a part-time basis.

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. Of the 27 new full or part-time faculty who were appointed since 2012, 15

are female. Of the 9 faculty who have achieved tenure since 2012, 6 are female. In the senior academic administration, 4 of the 5 vice-deans, associate deans, and assistant dean, are racialized. We continue to consider all aspects of EDI in all of our appointments and promotions decisions. Members of our promotions committee and search committees attend workshops on Inclusive Practices provided by the university.

## Challenges

Our budgetary challenges prevent us from growing our complement. As such, we have to determine priorities for recruitment, such as which research foci to support or grow. As well, as mentioned in the introduction, a major challenge has been recruitment of academics into clinical streams. This is a finding shared by other dental schools, where recent data have shown that there are over 271 openings for full time academics, and another 64 vacant part-time positions, in dental schools in North America (Wanchek et al, *Journal of Dental Education* 2017; 81:1033-1043).

The previous self-study acknowledged the challenges of not having a clinical professorial stream in a dental school, which is common in many other dental schools. Our plan was to utilize the newly established appointment stream approved at the University of Toronto in 2016. This introduced the professorial ranks for teaching stream, that 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. As stated in our previous self-study, we planned on increasing the proportion of teaching stream faculty in order to more effectively address our teaching needs. Of the 6 new full-time appointments, 5 are in teaching stream. For 2021-22, we have been given approval for 4 searches for full-time faculty, of which 2 will be in the teaching stream and 2 will be in the tenure stream.

Another challenge has been to optimize the working experience for our faculty. The University of Toronto carries out its “Speaking Up” surveys 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 was helpful to guide us for improvements. Communication had been identified as being weak, a finding also noted in our Strategic Planning process. The creation of the new position of Communications Officer in 2015 is a partial attempt to address this. The ability to attain research funding was noted to be a source of stress for faculty members. 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. As

noted elsewhere in this document, new faculty members now have two mentors assigned to them to help guide them to prepare for tenure or continuing status.

## Faculty Development

The importance of faculty development was recognized in our 2014-19 Strategic Plan. This led to the creation of a Faculty Development committee in 2017. This committee developed and coordinated regular faculty development lunch and learn seminars throughout the year. Seminar topics included how to develop course outlines and how to write multiple choice questions. This committee also organized an annual Education Day.

Education Day was initiated in June 21, 2018. Speakers included faculty members from the Centre for Faculty Development and CAMH (director of simulation and teaching excellence). The second Education Day was on June 11, 2019 and focused on effective presentation and effective feedback. Due to Covid-19, Education Day was held online on May 28, 2020 and the topic dealt with online teaching and learning. The next Education Day will be held on January 7, 2022 on the topic of “Lessons learned from the Pandemic”.

The Faculty Development committee also developed a micro-credentialing course. This micro-credential started in November 2021 and will conclude in February 2022. It was offered to faculty members who are or will be course directors. The goal is to improve the participant’s knowledge of learning pedagogy with respect to course design. This course involves four 2-hour workshops with one assignment per workshop.

Workshop topics include:

- The Learner at the Centre: Using Learning Theory to Enhance Outcomes
- Learner Success as the Outcome: Competencies and Educational Outcomes
- Evaluation Blueprints: Improving Validity for Learner Outcomes

The Strategic Plan also led to all newly appointed full-time faculty being appointed two mentors, who meet with them regularly and help guide them as they prepare for tenure or continuing status review.

In non-Covid-19 years, the Faculty’s Dean’s Lecture Series would bring in top international scientists to present to and meet with faculty and students.

Beyond faculty-specific learning opportunities, all faculty are eligible for a 6-month research and study leave (sabbatical) 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).

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-tenured 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 specialty programs and is retained by that discipline to use as further incentive and support for 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 budgetary challenges. Unless the latter improves, it prevents us from increasing overall FTE, and in fact, we have to consider a gradual reduction. This requires careful planning in order to maintain our strengths in research and teaching. Succession planning in the various fields must always be considered but is affected by challenges in recruiting in the clinical fields, as discussed earlier, and the lack of mandatory retirement policies.

For 2021-22, we have searches for a pain scientist at the assistant professor rank (to replace a retirement from 2019); an assistant professor, teaching stream in oral and maxillofacial radiology (to replace a retirement from 2015); an assistant professor, teaching stream in clinical dentistry (to replace a retirement from 2020); and an assistant professor in restorative dentistry (to replace a departure in this discipline later this academic year). Longer term, in order to replace past retirements, our plan is to proceed with full-time searches in pediatric dentistry, prosthodontics, and periodontics. As well, this year will see the transition of one of our senior scientists to a status-only professor rank as he takes on a research chair position at an affiliated hospital's research institute. We have made the decision to let the incoming dean determine which research focus should be pursued in a search for his replacement.

# 6. RESEARCH

## Scope, Quality & Relevance

The Faculty is renowned for its innovation and cross-disciplinary programs within the global academic and research communities. Research programs fall under seven broad themes, reflecting the breadth and depth of the Faculty's research enterprise.

- biomaterials and biomedical engineering
- connective tissue and regenerative medicine
- dental public health
- education research
- microbiology
- oral pathology and cancer
- pain and neuroscience

In recognition of its research excellence, the Faculty was awarded the prestigious 2021 William J. Gies Award for Achievement–Academic Dental Institution from the American Dental Education Association ADEAGies Foundation. The Gies Award recognizes individuals and organizations that epitomize the highest standards in oral health and dental education, research, and leadership. A number of the details of our research metrics and accomplishments are contained within our Dean's Annual Reports (see Appendix 7, for the 2 most recent reports).

## Research Facilities

In 2018, the Faculty undertook an historic complete renovation of its research facilities encompassing 2 full floors and over 40,000 sq. ft, resulting in modernized open concept research laboratories, offices, and collaborative space. This revitalization has created an unprecedented opportunity for us to expand our role as a global leader in oral and systemic health research, and further enables our vision of vertically integrating our research, education, and clinical activities.

In 2019, the Faculty officially opened its dedicated imaging facility the Collaborative Advanced Microscopy Laboratories of Dentistry (CAMiLoD). This fee-for-service facility combines state-of-the-art imaging technology to study cells, tissues, and materials at all levels of resolution with histology and mechanical testing offered to researchers and companies across the Greater Toronto Area to conduct scientific research. The Faculty's histology unit specializes in processing mineralized tissues, such as teeth and bone that are challenging to work with and often require highly sophisticated techniques for processing. In addition, we also perform routine histological analyses on non-mineralized tissues. Our mechanical testing facility uses state-of-the-art instrumentation to perform a variety of

analyses to characterize biological specimens as well as other (bio)materials, including hardness tests, three-point bending, fatigue testing, torque analyses, etc.

## **Research Themes**

### **Biomaterials & Biomedical Engineering**

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. Karina Carneiro** joined the Faculty as assistant professor (tenure-stream) in 2016 after completing science training (Ph.D. 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 BME.

**Dr. John Davies** received dental (B.D.S.) and science degrees (Ph.D., D.Sc.) in the U.K. His research laboratory is located in the Lassonde Mining Building of BME, where he has a budgetary cross-appointment. 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 (D.D.S., M.Sc., and Ph.D.) in Brazil and has established an active research program on dental restorative materials with a particular focus on zirconia-based materials. Her NSERC-funded studies include the characterization of structural changes on ceramic surfaces to improve adhesion, mechanical properties, and resistance to failure.

**Dr. Yoav Finer** is a clinician-scientist (D.M.D.; Ph.D.) 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 BME.

**Dr. Anil Kishen** (B.D.S., Ph.D.) 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. His research is supported by funds from the American Association of Endodontists Foundation and NSERC, and covers several research themes at the Faculty, including Biomaterials.

**Dr. Vanessa Mendes** (D.D.S., M.Sc. (O.M.S.), M.Sc. (Perio), Ph.D.) is director of the graduate specialty program in periodontology and teaches courses at both graduate and undergraduate levels. Her research work focuses on understanding mechanisms of peri-implant healing and developing strategies for bone tissue engineering and bone regeneration and has more recently included research in education.

**Dr. Anuradha Prakki** also received dental and science training (D.D.S., M.Sc., Ph.D.) 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. Paul Santerre** obtained his Ph.D. 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, recently renamed as BME) 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. He has a budgetary cross-appointment with BME. 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. He is also the director of the Health Innovation Hub (H2i), Temerty Faculty of Medicine, and was named inaugural Baxter Chair for Health Technology and Commercialization, UHN-Techna. Dr. Santerre has moved his laboratory operations to the 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. Annie Shrestha** (D.D.S., M.Sc., Ph.D.) has a laboratory that focuses on cutting-edge research to explore novel treatment strategies to improve the healing and treatment outcome in chronic oral infections. The lab has ongoing projects that involve immune cells – specifically antigen presenting cells, to understand the relation between chronic oral infections and immune dysbiosis in metabolic syndrome. Dr. Shrestha along with Dr. Anil Kishen has commercialized an oral healthcare product Uno Gel™ (produced in Ontario) through Oral Antibacterials Inc. She has received a number of awards including an Endodontic Educator Fellowship Award from the American Association of Endodontists Foundation and Colgate Award for Research Excellence.

## Connective Tissue & Regenerative Medicine

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. This theme includes a broad range of topics including biomineralization, mechanobiology, and immunology to impact disease diagnosis, treatment and the development of novel drug targets and other therapies. 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. Our multidisciplinary researchers build collaborations and cross appointments with many other faculties and departments at the university to develop clinically relevant discoveries.

**Dr. Laurent Bozec** joined the Faculty's research enterprise in 2018. Formerly Head of Research at the Eastman Dental Institute (London, UK) he is conducting cutting edge research on a variety of topics including the study of collagen structure and its relationship to tissue mineralization, novel imaging modalities for mineralized and connective dental tissues and biophysical characterization of structures affected in a variety of oral (and systemic) pathologies. He specializes in atomic force microscopy and uses nanometrology to study everything from bacterial infections, diseases of collagen, polymers and implant materials and more. His research is supported by NSERC, the Network of Canadian Oral Health Research (NCOHR) and commercial sponsors.

**Dr. Bernhard Ganss** is our current vice-dean, research, received his Ph.D. 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 BME and his work has been continuously supported mainly by CIHR and NSERC grants

**Dr. Michael Glogauer** has a lab that covers both fundamental and clinical studies. As a trained clinician/scientist (D.D.S., Ph.D.) 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** is a trained orthodontist and clinician/scientist (D.D.S., Ph.D.). 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** is a fundamental scientist (Ph.D.). Dr. Hinz' overall research theme is the molecular pathogenesis of fibrotic diseases. Dr. Hinz was instrumental in establishing the Collaborative Advanced Microscopy Laboratories of Dentistry (CAMiLoD) at the Faculty in 2019, and is its director. This academic year, Dr. Hinz is transitioning to a status-only appointment to continue his directorship of CAMiLoD, as he takes on a research chair position at an affiliated hospital's research institute.

**Dr. Morris Manolson** is a basic scientist (Ph.D.). Dr. 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** is the most senior investigator in this theme. Dr. McCulloch (D.D.S., Ph.D.) has developed a long-standing, highly successful research program that addresses fundamental questions of connective tissue matrix remodeling. 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 295 peer-reviewed scientific publications and has had a defining influence on the understanding of cell-matrix dynamics with over 9,500 citations. Dr. McCulloch has held a tier 1 Canada Research Chair (CRC) in Matrix Dynamics from 2006 to 2020. He is the recipient of the inaugural Canadian Association of Dental Research (CADR) /Association of Canadian Faculties of Dentistry (ACFD) National Dental Research Award. Funding support for his research has been obtained from a large variety of sources including CIHR, CFI-IF, NSERC, and ORF-RE.

**Dr. Howard Tenenbaum** (D.D.S., Ph.D.) has many research accomplishments since the early 1980s. His projects 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 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.

## 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** has research interests that 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 (D.D.S., Ph.D.) 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** has research that focuses on oral health-related issues and challenges in aboriginal and vulnerable populations. Dr. Lawrence (D.D.S., Ph.D.) 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** (D.M.D., Ph.D.) is a researcher and dental public health specialist. He is the director of the graduate specialty 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, regional Public Health organizations and most recently by a large philanthropic gift from GreenShield Canada.

## Pain & 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** is a clinician/scientist (D.D.S., Ph.D.) 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 uses 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** is an orthodontist and scientist (D.D.S., Ph.D.) 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. Most recently his work has received support through a CIHR Operating grant to identify novel biomarkers in temporomandibular disorders (with Dr. Moayed).

**Dr. Massieh Moayed** joined the Faculty as assistant professor (tenure-stream) in 2016. During his graduate (Ph.D.) 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. His research is supported by CIHR, NSERC and the National Institutes of Health (NIH, US).

**Dr. Barry Sessle** (B.D.S., Ph.D.) has conducted research (since 1970s) that 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. His current research continues to investigate sensorimotor function and plasticity using primate and rodent models. 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). Dr. Sessle received the IADR gold medal in 2020, the highest honor issued by the International Association for Dental Research.

## Microbiology

This theme focuses on the nature and role of microorganisms in oral and systemic health. Researchers in this theme take a holistic approach to understanding the sum of all microbiota (“microbiome”) in health and disease while simultaneously deciphering mode of action and mitigation strategies for specific microorganisms in the pathology of e.g. dental caries, periodontal disease, and endodontic infection.

**Dr. Dennis Cvitkovitch** is a former associate dean, research (2008 – 2015). Research by Dr. Cvitkovitch (Ph.D.) 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 signaling 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. Céline Lévesque** (Ph.D.) has a focus in her lab that 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) from 2011 to 2021.

**Dr. Tara Moriarty** (Ph.D.) has a focus in her lab that studies the details of dissemination mechanisms of blood borne microbes with a particular focus on spirochetes. The Lyme disease pathogen *Borrelia burgdorferi* 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.

## Oral Pathology

Research in this theme focuses on the mechanisms that cause oral cancer metastasis and cancers of the head and neck and allow for much earlier diagnosis and treatments. The pathology service is further a resource for undergraduate and graduate research.

**Dr. Grace Bradley** (D.D.S., M.Sc.) is one of six 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** is a clinician/scientist (D.D.S., Ph.D.) 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 and, more recently, a CIHR Operating Grant.

## 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. This research is mainly geared towards long-term considerations for improving teaching and learning in the undergraduate D.D.S. 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.

**Dr. Marco Caminiti** (D.D.S., M.Ed., F.R.C.D.) is the director of the graduate specialty program in oral and maxillofacial surgery at the Faculty. He is an active surgeon at Mount

Sinai Hospital and head of oral and maxillofacial surgery at Humber River Hospital. His research and clinical specialties include oral and maxillofacial surgery, orthodontics, and education research.

**Dr. Laura Dempster** is the current lead member in this theme. Research by Dr. Dempster (Ph.D.) 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. Eszter Somogyi-Ganss** (D.M.D., M.Sc., Ph.D.) is a prosthodontics specialist with expertise as a maxillofacial prosthodontist. She is the clinical and research director at the Craniofacial Prosthetic Unit, Sunnybrook Health Sciences Centre. In addition to her research in maxillofacial prosthodontics, Dr. Somogyi-Ganss also pursues education research.

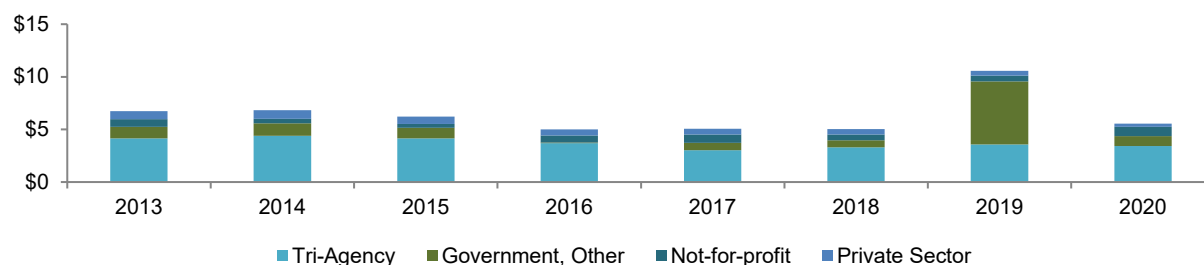
**Dr. Michelle Wong** (D.D.S., M.Sc., Ed.D.) is the director of the graduate specialty program in dental anaesthesia. She instructs graduate and undergraduate students and is active as a practicing dental anaesthesiologist at Sunnybrook Health Sciences Centre. Her research and clinical specialties include dental anesthesia, pain and education research.

**Dr. Carilynne Yarascavitch** (D.D.S., M.Sc.) is a former Fellow of the Wilson Centre. As a staff dentist and dental anaesthesiologist at Sunnybrook Health Sciences Centre in Toronto, she leads a Heart and Stroke Foundation-supported Course for Advanced Cardiac Life Support. Her research covers a number of areas related to dental anaesthesia as well as education research.

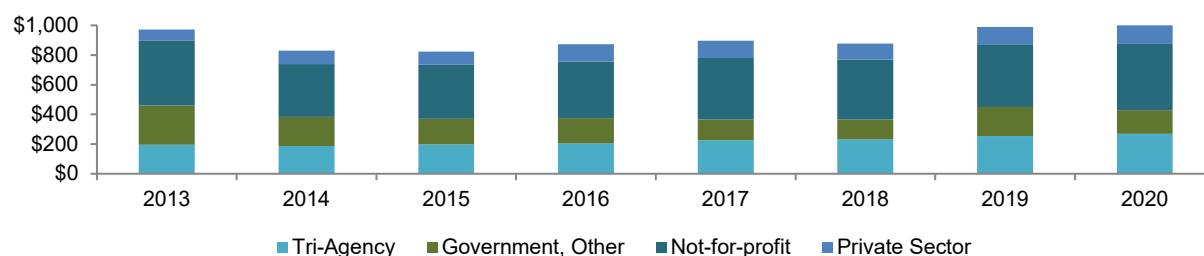
## Research Funding

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

**Level of Research Funding -Budget Installment Amount by Grant Year  
Faculty of Dentistry  
(in \$ millions)**



**Level of Research Funding - Budget Installment by Grant Year  
Life Sciences Dept. Class  
(in \$ millions)**



Data Source: Research & Innovation Dashboard ART: Ad-hoc Reporting Tool (last updated June 2, 2021)

NOTES:

1. This table includes all funding administered through the unit, regardless of the nature of the PI's appointment (e.g. cross-appointed, part-time). If a PI associated with this unit has elected to administer a grant through another unit, then that grant is not included in the amounts in these tables. If a PI not solely associated with this unit has elected to administer a grant through this unit, then that grant would be included in the amounts in these tables.
2. The Grant Year runs from April to March (e.g., 2020 refers to April 1, 2019 to March 31, 2020).
3. Research data is dynamic and is refreshed monthly, but this is especially true with the most recent grant year. Please regard the most recent grant year data as an approximation and subject to change. The Ad-hoc Reporting tool includes award amounts administered both by U of T units and any of its affiliated institutions.
4. Tri-Agency includes Canadian Institute of Health Research, Natural Sciences & Engineering, Social Sciences & Humanities, and Tri-Agency Institutional Program Secretariat (CRC's, Canada First Research Excellence Fund, Tri-Agency Institutional Program).
5. Canadian Institute of Health Research includes: Grant Programs, Research related activity, salary programs, training programs.
6. 'Government, Other' include: Federal Government, Foreign Government, Municipal Government, Networks of Centres Excellence, Ontario Prov. Govt., Prov. Govt. - other, Prov Centres Excellence, United States Govt.
7. 'Not-for-profit' includes: Internal (Banting & Best Diabetes Centre, Baycrest Centre for Geriatric Care, Centre for Addiction and Mental Health, Community Partnership Lab/Connaught, Connaught Fund, Connaught, ISI, Divisions, Hospital for Sick Children, l'Anson Fund, Mount Sinai Hospital, St Joseph's Health Centre, St. Michael's Hospital, Sunnybrook & Women's College Health Sciences Centre), Not-for-profit, Research & Acad Sector.
8. The ART ad-hoc reporting tool classifies each department/research unit into one of four Dept. classes based on the primary funding source for the department (Humanities or Social Sciences [primarily SSHRC funding], Life Sciences [primarily CIHR funding], or Physical Sciences [primarily NSERC funding]). The research cube classification is not necessarily the same as the SGS Divisions.
9. The Life Sciences Dept. Class includes the following departments and research units:
10. Dalla Lana School of Public Health: Gage Occup. & Environ. Health Unit,
11. Inst. of Health Policy, Management & Evaluation, Joint Centre For Bioethics (Historical), Ont. Tobacco Research, Public Health Sciences (DLSPH); Faculty of Arts & Science: Dept. Of Psychology; Faculty of Dentistry; Faculty of Kinesiology and Physical Education; Faculty of Medicine: Bant & Best Dept. Med Res (Inactive), Banting & Best Diabetes Ctr., Continuing Education, Medicine, Ctr. for Research in Education, Ctr. Res. Neurodegenerative Diseases, Dept. of Anaesthesia, Dept. of Biochemistry, Dept. of Family & Community Medicine, Dept. of Immunology, Dept. of Lab. Medicine & Pathobiology, Dept. of Medical Biophysics, Dept. of Medical Genetics, Dept. of Medical Imaging, Dept. of Medicine, Dept. of Molecular Genetics, Dept. of Nutritional Sciences, Dept. of Obstetrics & Gynaecology, Dept. of Occupational Therapy, Dept. of Ophthalmology and Vision Sciences, Dept. of Otolaryngology, Dept. of Paediatrics, Dept. of Pharmacology, Dept. of Physical Therapy, Dept. of Physiology, Dept. of Psychiatry, Dept. of Radiation Oncology, Dept. Of Rehabilitation

Science (Graduate), Dept. of Speech-Language Pathology, Dept. of Surgery, Division of Anatomy (In Dept. of Surgery), Electron Microscopy Unit, Genomics and Global Health, Inst. for Human Dev. Lifecourse & Aging, Inst. of Medical Science, MD/Ph.D. Program, Med: Ofc. Of The Dean, Med: Inst. of Biomaterials & Biomedical Engineering, Ofc. of The Dean – Faculty, Structural Genomics Consortium, The Donnelly Ctr. for Cellular & Bimolecular Res., UME: Mississauga Academy; Faculty of Nursing; Faculty of Pharmacy; UT Mississauga: UTM: Psychology; UT Scarborough UTSC: Psychology, UTSC: Dept.-Psychology.

12. The Research by Grant Year (April-March) aligns with the fiscal year of our largest group of sponsors, the federal and provincial governments.
13. The budget Installment amount is the amount of money awarded for a grant application calculated as the sum of budgeted installments (as opposed to the total grant amount, as not all expected values may be reflected yet in the budget).
14. The awards count is the number of active awards in the grant year. Multi-year awards are counted in each year in which they receive new budget instalments.

**\$4,439,412.64 = Total research grants and awards extends from April 1, 2020 to March 31, 2021.**

**74 = total number of research awards currently held**

**41 = number of new grants, 2020-21**

**\$2,244,221.98 = new grant funds, 2020-21 fiscal year**

<b>TOTAL RESEARCH FUNDING FOR PERIOD APRIL 1, 2020 TO MARCH 31, 2021</b>	
Associations	\$ 141,240.82
CIHR	\$ 1,980,118.00
Corporations	\$ 200,466.00
Education	\$ 544,354.65
Federal Government (excluding CIHR and NSERC)	\$ 676,307.57
Foundations	\$ 102,136.00
Hospitals	\$ 20,000.00
Internal	\$ 50,000.00
International Orgs.	\$ 8,923.60
NSERC	\$ 397,760.00
Ontario Prov. Govt.	\$ 148,089.00
Other	\$ 110,017.00
Societies	\$ 60,000.00
<b>TOTAL DENT FUNDING</b>	<b>\$ 4,439,412.64</b>

## **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.

## Publications 2020-21

Total publications= 289. Total publications include disciplines outside of dentistry such as medicine and biochemistry, as well as other multidisciplinary publications

Citations= 553

Average citations per publication = 1.9

Data source: Scopus, retrieved on June 30, 2021

U of T Dentistry continues to produce publications that demonstrate research impact both nationally and internationally. Compared with Canada's other nine dentistry schools, U of T Dentistry ranks first in the category of scholarly output and view count, and second in the categories of citations count, number of citing countries and online mass media. U of T Dentistry remained competitive in relation to U.S. and international schools.

National Benchmarking 2020-21

Institution	Scholarly Output (Dentistry)	View Count	Citations Count	No. of Citing Countries	Mass Media (Online):
Dalhousie University	25	313	29	23	75
McGill University	94	1017	169	60	189
University of Alberta	137	1664	320	68	201
University of British Columbia	123	1240	196	52	153
Université Laval	17	217	42	38	8
University of Manitoba	30	386	47	35	44
University of Montreal	37	517	83	36	1
University of Saskatchewan	22	353	208	53	249
University of Toronto	<b>222</b>	<b>2036</b>	<b>272</b>	<b>65</b>	<b>586</b>
Western University	40	339	31	22	1359
<b>DATA SOURCE: SciVal, derived from Scopus, retrieved on July 8, 2021</b>	Scholarly Output: the number of publications of a selected entity.	View Count: total views received by publications of the selected entities.	Citation Count: total citations received by publications of the selected entities.	Number of Citing Countries: the number of distinct countries represented by the publications citing a selected entity.	Mass Media (Online): total of mentions in the media received by publications of the selected entities.

**U.S. Benchmarking: 2020-21**

Institution	Scholarly Output	View Count	Citations Count	No. of Citing Countries	Mass Media (Online):
Columbia University	105	989	201	52	823
Harvard University	337	2985	577	78	3354
New York University	642	6038	1151	102	3866
University of California at Los Angeles	108	1047	112	42	2152
University of California at San Francisco	119	1175	289	59	1498
University of Florida	183	1527	221	58	302
University of Iowa	131	1533	269	63	288
University of Michigan, Ann Arbor	351	3633	696	81	1152
University of Minnesota	113	1135	131	62	322
University of North Carolina	272	2806	550	80	1559
University of Pennsylvania	236	2062	343	55	1330
University of Toronto	<b>222</b>	<b>2036</b>	<b>272</b>	<b>65</b>	<b>586</b>
University of Washington	228	2462	542	58	950
<b>DATA SOURCE: SciVal, derived from Scopus, retrieved on July 9, 2021</b>	Scholarly Output: the number of publications of a selected entity.	View Count: total views received by publications of the selected entities.	Citation Count: total citations received by publications of the selected entities.	Number of Citing Countries: the number of distinct countries represented by the publications citing a selected entity.	Mass Media (Online): total of mentions in the media received by publications of the selected entities.

International Benchmarking: 2020-21

Institution	Scholarly Output	View Count	Citations Count	No. of Citing Countries	Mass Media (Online):
Karolinska Institutet	291	2860	651	81	85
King's College London	513	4764	1007	102	531
Tokyo Medical and Dental University	270	2386	253	51	57
University of Amsterdam	241	2771	628	77	54
University of Bern	355	3674	741	96	29
University College London	196	1785	448	55	546
The University of Hong Kong	293	4270	673	84	1071
Universidade de São Paulo	1022	10951	1277	104	5
University of Toronto	<b>222</b>	<b>2036</b>	<b>272</b>	<b>65</b>	<b>586</b>
Vrije Universiteit Amsterdam	174	2137	436	63	10
<b>DATA SOURCE: SciVal, derived from Scopus, retrieved on July 9, 2021</b>	Scholarly Output: the number of publications of a selected entity.	View Count: total views received by publications of the selected entities.	Citation Count: total citations received by publications of the selected entities.	Number of Citing Countries: the number of distinct countries represented by the publications citing a selected entity.	Mass Media (Online): total of mentions in the media received by publications of the selected entities.

## Collaborations

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

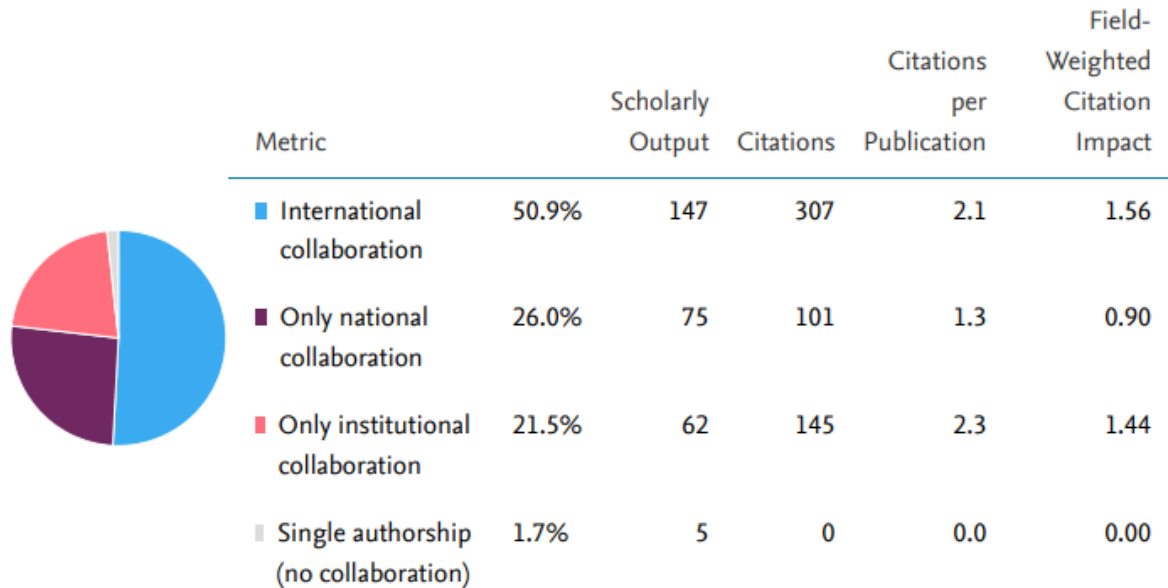
- The level of national and international collaboration, both compared to other Canadian dental schools
- The level of national and international collaboration, both compared to selected U.S. dental schools.

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. The relatively low number of national collaborations may be related to greater opportunities for impactful partnerships either within the



university, hospital and commercialization hubs in Toronto (i.e. the “Discovery District”) or internationally. The expansion of international partnerships is one of the Faculty’s priorities for future improvement.

Scholarly Output in Dentistry\_Publication\_Past\_Year\_20210707, by amount of international, national and institutional collaboration



## Economic Impact

Metrics for economic impact for the Faculty of Dentistry show that in the past 5 years we had 18 confidential invention disclosures, 7 patents filed, 1 license issued, and 3 start-up companies formed. The need for translation and commercialization of research findings continues to play an important role in our Faculty’s strategic priorities. Recently formed partnerships with the Faculty of Applied Sciences and Engineering are expected to lead to an increase in the metrics related to economic impact.

## 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. The program provides

opportunities for summer students to gain experience in laboratory and clinical research. With the exception of the summer of 2020, due to Covid-19 restrictions, 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 & dentofacial orthopedics, 13 in oral & maxillofacial surgery, 6 in oral & maxillofacial radiology, 3 in oral & maxillofacial 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, many 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 primarily pursue a career in their respective clinical specialties, but often maintain ties with academic institutions as part-time instructors, with a number going on to be full-time faculty.

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. Over the past three years, the Faculty's Research Day has been generously sponsored by the Ontario Dental Association. The ODA has recently renewed their commitment to support this event from 2021 to 2024.

## Postdoctoral Fellows

As of September 2021, the research facilities at the Faculty of Dentistry have engaged 40 postdoctoral fellows (PDFs) over the past five years, 10 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 introduced a means to review all grant applications before submission. With the help of a Research and Business development Manager, an internal grant review program was initiated. This program was rolled out for the major 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-tenured) 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. This revitalization was completed in 2018 and now allows the vast majority of research to be conducted in one building together with all its clinical and training operations. This proximity presents unique opportunities for the development of a robust clinical research infrastructure and opportunities to engage with commercial sponsors and non-government organizations.

Engagement in international partnerships is another important aspect for the Faculty to raise its profile on the global stage. In an effort to improve its ranking by various metrics (QS ranking, Shanghai ranking etc.), the research office has engaged in conversations with the Universities of Cardiff (Wales), Melbourne (Australia) and West China School of Stomatology (Chengdu, China) to form a four-party entity with the ultimate goal to facilitate student exchange, research collaborations and improvement of clinical practice.

Lastly, the general lack of recognition of dental research and its ground-breaking contributions to health care beyond the oral cavity needs to be addressed to correct the perception that dental research has limited scope and capacity. Several key positions have been created to help improve the image of dental research and to adequately recognize its contributions to tissue homeostasis, biomaterial development, host-microbiome interactions, public health, and education, to name a few.

Dr. Farah Thong, Dentistry’s Research and Business Development Manager, has been the driving force behind large-scale, multi-centre, multi-sector, interdisciplinary research initiatives led by the Faculty of Dentistry. She was instrumental in the success of several multi-million-dollar applications (e.g., Canadian Foundation for Innovation, Ontario Research Fund) by coordinating the applications and by providing strategic writing of the proposals. These applications resulted in >\$10M research funds to establish Canada’s first state-of-the-art comprehensive Fibrosis Network, which comprises researchers from the Faculty of Dentistry, the university’s Faculty of Arts and Science, Ted Rogers Centre for Heart Research, St. Michael’s Hospital, and Toronto Western Research Institute. Farah plays a central role in promoting the Faculty’s research capabilities to increase collaborations, fee-for-service activities, and commercialization opportunities. In addition, she works with the university’s central research offices (e.g., Corporate Partnerships Officer, Office of the VP, International) to pursue opportunities with the private sector. She is also actively involved

in mentoring junior faculty. A critical aspect over the coming years will be the development of collaborations to accelerate discovery, translation, and commercialization.

The Faculty's Communications Manager will, together with the Office of Advancement, continue to help with appropriate means for dissemination and promotion of research news with the objective to increase awareness and support by philanthropists and alumni.

Lastly, the Faculty has received generous support from the university's central research office to employ one new research support staff. To be hired in the fall of 2021 for a limited term of three years, this person will primarily focus on working with individual principal investigators to improve competitiveness of their specific grant applications.

In summary, the last five years have been highly transformative for the Faculty's research enterprise. Revitalization of its laboratory infrastructure has created vast opportunities for collaboration, translation, and the development of commercial partnerships. With this new development, the Faculty is poised to continue and further expand its leadership role in research on a global scale.

## **7. CLINICAL SERVICE**

## Scope of Activities

The Faculty of Dentistry is Canada's largest dental school. The 266-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 90,000 appointments per year in the 10 undergraduate and graduate clinics located throughout the building.

An additional 41 chairs are located in the Faculty's off-site clinic located at 777 Bay Street, which opened on schedule in September 2021. This clinic will increase student access to fully enclosed operatories, currently required by the provincial regulatory body (RCDSO) for aerosol generating procedures, such as those created when operating a dental handpiece.

To better support the clinical operation, a central sterilization centre is in the process of being constructed on the first floor of the Faculty. This facility is slated to open in late Fall of 2021. At that time, all of the steps integral to the reprocessing of instruments will be relegated to this centre. Centralized instrument reprocessing improves process consistency and accountability, and reduces the potential for injury that may arise when there is student involvement in the cleaning of dental instruments.

The majority of the patients treated at the Faculty are classified as the working poor. They most often attend the Faculty's clinics because of the fees for services that generally run approximately 50% relative to the fees levied in private practice. The Faculty generates patient fees of \$7M annually which translates to an even greater value in service for these patients in the community. According to a survey done at the Faculty in 2014, for those who have difficulty accessing care in private practice, hospital emergency rooms are often, inappropriately, the site for treatment. An update to this survey is being conducted over the summer of 2021, and the data will be available in the fall.

The Faculty of Dentistry treats unique subsets of the population that are predominately:

- female
- 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 that face its patient population. In 2020-21, \$77,739 was distributed to patients treated mainly in the undergraduate clinics. 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:

- patients receive the care, they would otherwise have to forgo, that is critical to their ability to function in daily life.
- students develop the sense of social responsibility integral to health care professions.
- 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 respective sections below.

## **Undergraduate Clinics**

The clinical program has its genesis in the preclinical program where 96 undergraduate dental students in first and in second year develop their clinical skills in specifically designed preclinical 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 (i.e. ‘fillings’).
- basic hand skills for periodontal procedures (specifically scaling and root planning; i.e. cleaning of teeth).
- 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 (i.e. ‘root canal treatments’).
- the planning and implementation of multiple areas of removable and fixed prosthodontics, including dental implants (i.e. ‘dentures and false teeth’).

- an introduction to removable and fixed orthodontics (i.e. 'braces').
- the unique clinical challenges encountered in the treatment planning and technical procedures inherent to pediatric dentistry (i.e. 'children's dentistry').

The overall objective of the preclinical program is for 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) to 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 a clinical setting in the 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 as it begins its third year for a total of 120 students. These students are assigned a number of new and continuing care patients, to 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. Recently, third year students have been paired with fourth year students while in clinic. Third year students assist the fourth-year students with their more complex procedures when the fourth-year student is the operator. Fourth year students act as peer-mentors when the third-year student is assigned as the operator.

Students attend this clinic 2.5 days per week. During the day, depending on the schedule, students will have two 3-hour sessions or three 2.5-hour sessions. Third year and fourth year

students also 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 that progress 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. As listed earlier in the section on the D.D.S. program, these external sites include assigned rotations to a number of affiliated hospitals and public health clinics in Toronto, as well as beyond in Ontario and globally. Elective rotations outside of Toronto have included: Haliburton, Ontario; Ethiopia; Uganda; Honduras; Guatemala; and the Dominican Republic. We hope to increase this community-based exposure in the future if conditions permit.

## **Graduate Clinics**

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 assessment and training program (DSATP) student, whose program may last up to 12 months in duration, registered for a defined period of time. These programs include:

- dental anaesthesia
- endodontics
- oral & maxillofacial radiology
- oral & maxillofacial surgery
- oral medicine & pathology
- orthodontics & dentofacial orthopedics
- pediatric 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 the disciplines of orthodontics and pediatric dentistry,

via self-referral. The fees for these specialty services are approximately one half in comparison to 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 unusual 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.

## **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.

The clinical program relies heavily on part-time clinical instructors. At present, approximately 500 part-time instructors rotate through 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-day, a full day, or more, on the clinic floor. 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 30-40 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.

The graduate clinical specialty programs also utilize the clinics for their training. The proportion of time devoted is described in the relevant section under graduate programs. A number of programs, such as dental anaesthesia, oral and maxillofacial surgery, and pediatric dentistry, among others, devote a significant proportion of a students' learning to 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. Implant studies and periodontology are often areas of clinical research. In order to conduct a study, the principal investigator contacts the Director of Clinical Affairs, who

prepares a contract for utilization of the clinical areas for support of the study. Funding for clinical research may be covered by a grant if 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 specialties. Some clinical research has been undertaken by undergraduate students engaged in research during the summer research period, but this utilization is significantly less common.

In 2021, a generous donation by GreenShield Canada, the largest to dental public health in Canadian history, funded the creation of a 2-chair research clinic. This clinical study will prospectively study the impact of removing barriers to access to dental care.

## Outreach to Local & 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 inability to receive care, and they provide unique educational opportunities for students that would not be possible within the Faculty facility itself. While the coordination of the various off-site rotations can be a challenge from both a logistical and time-availability perspective, the intention is to expand in this area where and whenever possible.

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)	# of ½ Days	Evaluation
Mount Sinai Hospital	Management of adult patients with disabilities	4	Faculty grades
Centre for Addiction & Mental Health (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

## **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 21. With that being said, our D.D.S. and graduate programs are intensive, and many of our students are challenged to access these by limitations on their time.

University of Toronto Student Life and Academic Success provides individualized support to Dentistry students with learning to manage time and stress, and developing new strategies including active studying, reading and note-taking, and exam preparation. Students can also obtain support with improving research skills, assignment completion, and presentation skills.

The Office of Advancement supports students in a variety of ways and works closely with the Dental Students' Society (D.D.S.). A sponsorship program helps raise funds for the D.S.S. to facilitate their many programs including their graduation formal and other extra-curricular activities. A vendor fair is put on each year for students to connect with various vendors who they may engage with post-graduation to support them in practice management, practice opportunities, insurance, wealth management. The more formal mentorship program for students and alumni to connect is being evaluated. In the past, several events including a peer-to-peer mentorship event, a young alumni mentorship event and a more experienced alumni to student mentorship event all took place to help support students in their preparation and expectations for life after graduation.

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 Houses Initiative, Big Sib-Little Sib, 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. We are also proud of our student-led initiatives, such as the annual talent and entertainment show, Dentantics, and student-run clubs: Dental Pride Alliance, SPEA, Wikipedia Collaboration of Dental Schools and Women in Dentistry, to name just a few. 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 has continued their work on initiatives to improve the well-being of students and staff at the school, and over the last year a comprehensive Wellness plan was developed, along with an online Wellness Portal with information, resources and supports for all stakeholders across the faculty. Some of our associated wellness 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. Brushmania 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 & 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; career, 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**

The Library report is contained in Appendix 23.

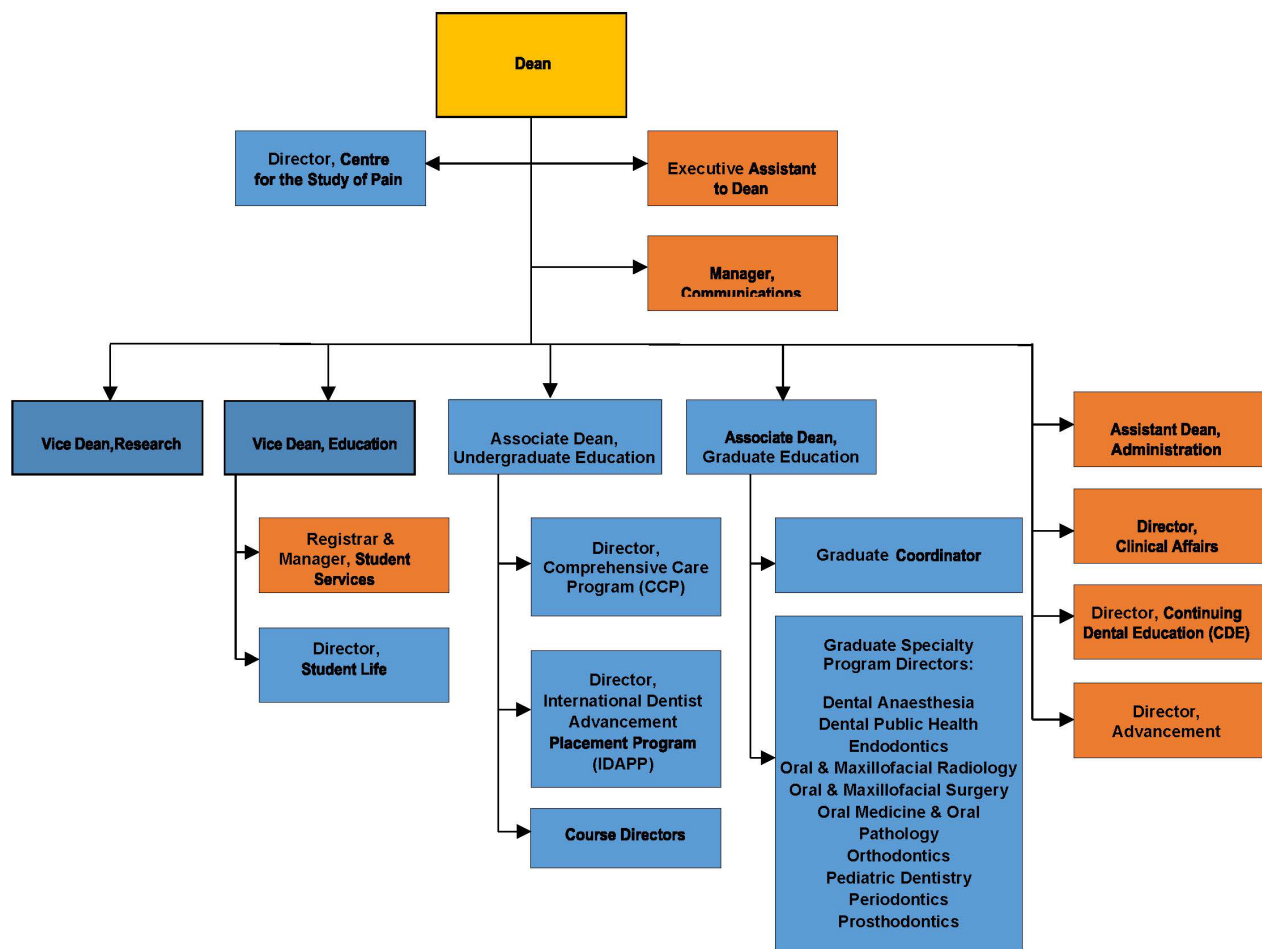
## **9. ORGANIZATION & FINANCIAL STRUCTURE**

# 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 was its chair for 2015-2017) as well as a member of the deans of the Single Department Faculties committee, the university's Academic Board, and for 2021-22, the university's Planning and Budget 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. This was also noted in the 2014-19 Strategic Plan. As such, a new organizational structure came into effect at the Faculty of Dentistry on July 1, 2016.

## Organizational Structure (since 2016):



# Financial Structure

The Faculty has been able to balance the annual budget every year for the last several years including the current 2021-22 fiscal year as shown on Table 9.1. Furthermore, with savings from temporarily unfilled academic and administrative positions as well as one-time savings from various projects, the Faculty has been able to accumulate funds for the operating fund reserve, some of which are allocated for capital projects.

Unfortunately, this trend will soon reverse and we are projecting an annual budget deficit starting next fiscal year (2022-23) and beyond, as shown on Table 9.1 and 9.2. This reversal in the budget situation is largely attributable to the following events:

- In January 2019, the provincial government announced and implemented a 10% tuition cut for all post-secondary education programs for the 2019-20 academic year. Furthermore, no tuition increases have been allowed for the following two academic years - 2020-21 and 2021-22. Future restrictions on tuition are unknown at this point. Needless to say, these decisions have had a significant negative financial impact on our budget (see Table 9.3). With additional support from the University Fund, we were able to balance the budget for these affected years. However, as the gap in the rate of annual increases between revenue (almost no increase) and cost (due mainly to increases in compensation, supplies, equipment, and facilities' costs) become larger, the projected total cost exceeds the projected revenue for these outer years, as shown on Table 9.2.
- The Faculty of Dentistry was disproportionately impacted by Covid-19 due to our inability to continue our clinical education and operation in most of our current clinic facilities because of new regulatory guidelines regarding aerosol generating procedures and other restrictions. After exploring all possible options, the Faculty decided to create a satellite clinic with 41 enclosed operatories located at 777 Bay Street (see the Infrastructure section for more details). This clinic will be fully operational starting in September 2021. The operation of this clinic will add approximately \$1-\$1.5 million annual cost to the clinic operation including its annual lease cost.

This satellite clinic will also function as a staging place when we implement the renovations to our simulation lab (Lab 4) and Clinic 2.

All efforts will be given to balance the budget as we continue to explore and implement ways/programs to increase revenues, including clinic revenue, revenue from CDE, donations that support the operation, and reducing costs.

**Table 9.1: Operating Budget (in millions \$)**

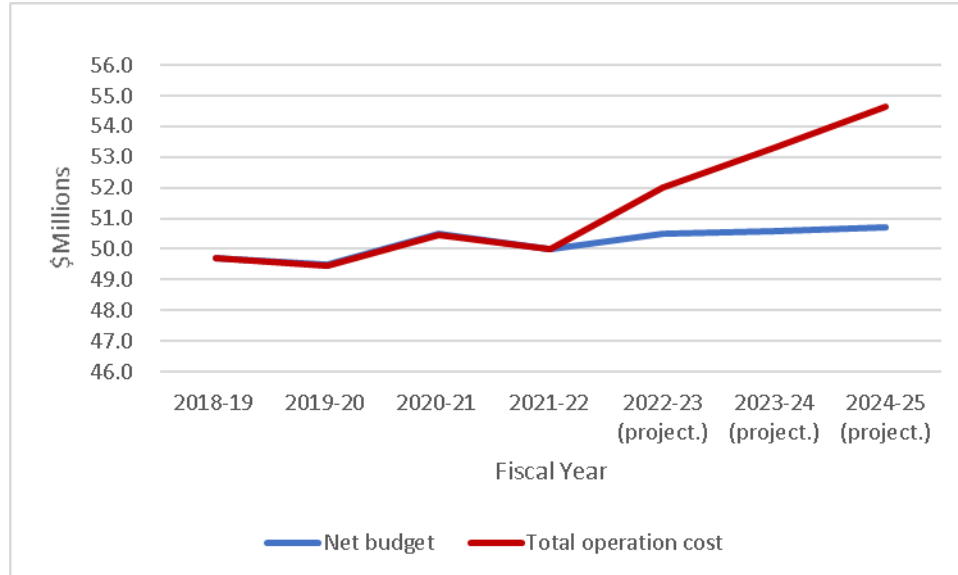
	2018-19	2019-20	2020-21	2021-22	2022-23 (project.)	2023-24 (project.)	2024-25 (project.)
Net budget transfer *	32.6	31.8	32.8	33.7	32.8	32.9	33.0
Clinic revenue/recoveries	7.7	8.0	8.0	7.0	8.0	8.0	8.0
Other revenue/recoveries **	9.4	9.7	9.7	9.3	9.7	9.7	9.7
<b>Net budget ***</b>	<b>49.7</b>	<b>49.5</b>	<b>50.5</b>	<b>50.0</b>	<b>50.5</b>	<b>50.6</b>	<b>50.7</b>
Compensation cost ****	23.2	23.2	23.5	23.4	24.1	24.8	25.6
Clinic cost	16.0	16.6	17.1	18.1	19.1	19.7	20.3
Other cost	10.5	9.7	9.9	8.5	8.7	8.7	8.7
<b>Total operation cost</b>	<b>49.7</b>	<b>49.5</b>	<b>50.5</b>	<b>50.0</b>	<b>52.0</b>	<b>53.3</b>	<b>54.6</b>
<b>Net operation deficit</b>	<b>-</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(1.5)</b>	<b>(2.7)</b>	<b>(3.9)</b>

\*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 etc.)

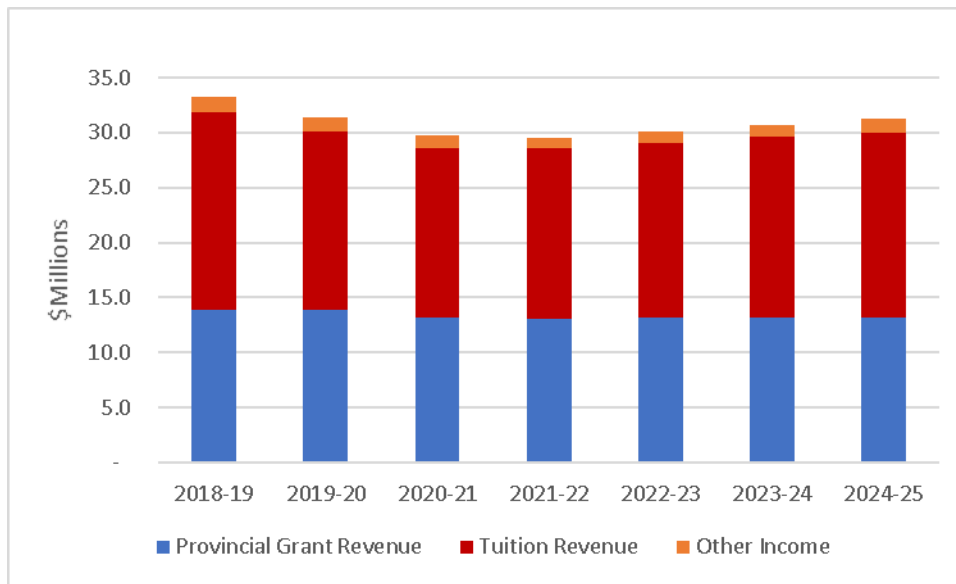
\*\*Division revenue includes revenues from CDE programs, IDAPP, student ancillary fees such as instrument fees etc.

\*\*\* Net budget is funds available for the operation - a total of net budget transfer, clinic revenue and other revenue and recoveries. \*\*\*\* 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

**Table 9.2: Operating Budget**



**Table 9.3: Gross Revenue Budget**



As mentioned earlier, the Faculty has accumulated funds towards major capital projects over the years. As of April 2021, there is a total balance of \$7M. This is comprised of \$4M in the Faculty operating fund reserve and \$3M in the UT Infrastructure Fund. This has been allocated for capital projects, specifically the renovations of Lab 4 and Clinic 2. In June of 2020 the UT Capital Project and Space Allocation Committee Executive (CaPS Executive) approved the Terms of Reference for the renovation of Lab 4 and Clinic 2. As well, on April 1, 2021, the CaPS Executive approved the request to engage consultants to initiate design services for Lab 4 and Clinic 2. A Request for Proposal (RFP) for consultants is currently in progress.

The estimated total project cost (TPC) for Lab 4 and Clinic 2 are \$12.5M and \$53.3M respectively. Efforts are continuing to determine financing of these projects.

## Challenges & Opportunities

Concern over financial sustainability was the rationale for commissioning the 2021 review entitled, Re-Envisioning Dental Education at The University of Toronto, carried out by Dr. Richard Valachovic and Sally Garner (see Appendix 25).

Some of the expected challenges with respect to budget for the next few years are : (1) projected annual deficit as mentioned earlier; (2) ever increasing cost for clinic operation, some of which are due to external factors such as new regulations for health and safety, new requirements for infection control, technology changes, or even US and Canadian currency differences as many clinic supplies and equipment are purchased from US manufacturers;



(3) funding for renewal of pre-clinic lab and clinic facilities that are already in progress; (4) increasing cost to maintain the current aged clinic facilities until the completion of clinic renewal; and (5) continuing uncertainties with impact of Covid-19 for clinic education and operation, and potentially unanticipated costs and revenue loss.

Some of the foreseeable opportunities are: (1) potential clinic operational efficiencies and increase in clinic revenue as well as exploring new initiatives such as expanding faculty intramural practice as well as the introduction of an Advanced Education in General Dentistry (AEGD) program (as discussed in the Valachovic-Garner report, Appendix 25); (2) with strong Advancement and Communications teams now in place, better opportunities to increase the level of annual donation and major gifts; (3) with the renewal of the research infrastructure, potential increase in grants and external research funding and hence increase in research overhead to support the operation; (4) potential PTR recovery as senior faculty members retire and are replaced with junior faculty members; and (5) continuing the discussion with the provincial government for new and/or increased funding for clinical education and operation.

## **Advancement**

The current Director of Advancement started with the Faculty in July 2016. Since that time there have been structural changes made to the team complement, activities realigned and enhanced, the conclusion of “Boundless”, the largest fundraising campaign in Canadian history and the new campaign is in the quiet phase with preparations already underway to prepare for a public launch in 2022. The description of our involvement in Alumni Relations is described in the section on Internal and External Relationships.

The staff complement has adjusted to more adequately support the Advancement Office’s function. The office structure is currently comprised of 4 full time employees. The director of advancement, a member of the senior leadership team at the Faculty, creates and oversees the strategic direction of advancement 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. Other team members include the Advancement Coordinator, Alumni and Donor Relations Officer and Development Officer, Leadership and Annual Giving.

The Advancement Coordinator role supports a full-range of administrative work and provides some communications support.

The Alumni and Donor Relations role encompasses more email and content marketing, social media and digital competencies as well as event execution, alumni board management and communications expertise.

The Development Officer, Leadership and Annual Giving, is a more front-line fundraising role than it has been in the past to help build the pipeline for major giving and manages the sponsorship program. Additionally, responsibilities to ensure more robust awards records and donor stewardship reporting has been added to this role to ensure greater transparency to our donors.

All of these roles have been enhanced and responsibilities deepened and broadened to service the advancement portfolio more optimally.

Connected to this, four key events that are Faculty and student centred have moved to the Student Services Office for event execution including the D.D.S. White Coat Ceremony, IDAPP White Coat Ceremony, First Year Orientation, and the Graduation and Awards Ceremony. In moving these events to Student Services, space has freed up in Advancement to plan more alumni and student focused programming including mentorship events, the Great Alumni Event and student Vendor Fairs.

Due to the pandemic, a shift to many online activities and digital and on-line communications, has been successfully executed including monthly webinars for alumni and friends as well as monthly e-newsletters. This work has been helpful in deepening engagement and growing our Dentistry alumni community. Digital events and alumni activities were very successful and captured 1,469 participants in FY 20 and 2,247 participants in FY21 compared to previous in-person event years maxing out at engagement numbers of 828 in the year we added the Great Alumni Event.

It is clear that a digital strategy and integrated in-person and digital events programming is required moving forward to continue building connections with our alumni and wider community.

The Boundless Campaign concluded on December 31, 2018 raising \$2.61B for the University of Toronto, setting a new high-water mark for philanthropy in Canada. Boundless was a success at Dentistry which exceeded the campaign target of \$18M by raising \$20.6M from 2298 donors.

The Faculty is planning to launch the next campaign in the new year. The Faculty of Dentistry's goal for this campaign is \$30M and so far, has raised more than \$11M from 527

donors. The Faculty welcomed its largest gift in its history of more than \$6,000,000 for the Green Shield Canada Clinic split between “Boundless” and the new campaign.

An area of highest priority for this next campaign will be infrastructure. The building at 124 Edward street requires significant upgrades in a variety of -spaces, but the focus will be on the pre-clinical simulation lab and Clinic 2, the largest of the Faculty clinics. A Dean’s Advisors group was struck to help test ideas and priority projects in 2019 and will transition to a campaign cabinet later this academic year to assist with more hands-on fundraising.

Other priorities including student support, outreach activities, research funding, and access to care remain priorities as well. Major gift fundraising and activities, greater digital reach and alumni storytelling and an innovative, service-oriented advancement program are the focus for the office.

## **10. RESOURCES & INFRASTRUCTURE**

# Overview

In 1959 the Faculty moved into 124 Edward Street, known as the Dentistry Building. Since 1959, a North addition was built in 1982, and most recently, consolidation of open concept wet lab space on the fourth and fifth floors was completed in a 2018 renovation. The Dentistry building is 14,000 net assignable square metres (NASM) in size (equivalent to approximately 150,000 square feet). It holds 2 open wet lab and support spaces on the 4th and 5th floors, 24 classrooms and lecture halls, seminar and meeting rooms, 12 clinics and support spaces, 160 faculty and administrative offices, student commons and student activity/lounge spaces, a multi-functioning auditorium, and a library. Though there has been some renovation, the majority of the Dentistry building remains unchanged, including the clinics. Over time, the Dentistry Building has experienced significant deterioration of its physical plant, and its general layout and infrastructure are inadequate to satisfy the Faculty's current needs and future growth.

In 2018, we vacated the second floor of the Fitzgerald building which used to house our Matrix Dynamics Group (5 highly functioning PIs along with their staff and students) for their labs, support spaces, and offices as they moved into the newly renovated 4th and 5th floors of the Dentistry Building. Three of our faculty members (two cross-appointed with BME) still have laboratories and their offices in the MaRS-2 complex, the Mining Building, and Medical Science Building (MSB).

In 2018, our library underwent a major renovation, with the addition of more individual study spaces with sound barriers, collaborative study areas, group study rooms fitted with smart technology, and a multi-faith room. This has resulted in improved spaces for our students.

In April 2019, the Faculty of Dentistry leased space (3,481 square feet) on the 5th floor of 123 Edward St. building to house the Faculty's Continuing Dental Education Unit as well as dry lab, support spaces and offices for two faculty members and their staff and students. This lease will end on June 30, 2026.

In February 2021, the Faculty of Dentistry leased space (19,207 square feet) on the 22nd floor of the 777 Bay St. building to create a satellite clinic. The construction for the satellite clinic was completed in September 2021.

## Updates to Research Facilities

Completed in 2018, the Wet Lab Consolidation and Revitalization project (supported in part by the Post-Secondary Institutions Strategic Initiative Fund) renovated approximately 3,800 NASM of existing laboratory and office space, as well as washrooms and corridors on the 4th and 5th floors of the Dentistry building. The renovation of two full floors reconfigured 95 crowded rooms into 21 large open-plan laboratories shared between all researchers to maximize flexibility and allow the space to adapt to changing needs of research. The space was designed to have shared equipment rooms to make more efficient use of space with specific environmental needs (ex: additional cooling). The renovation also included a new collaboration space, informal and formal meeting spaces and offices for faculty, staff and students.

Safety in the wet labs was greatly improved making all labs biosafety level CL2 compliant. Infrastructure upgrades for the two floors included replacement mechanicals systems serving the two floors and updated electrical services. Technology upgrades were undertaken to modernize the data connections, network rooms and AV in meeting spaces.

## Updates to Clinic Facilities

A Clinic Master Plan was initiated by the Faculty in 2019 to identify opportunities for providing the Faculty of Dentistry a modern clinic space to process patients effectively and efficiently as well as meet current clinic practice standards. The Master Plan provides a reorganization of the Basement, 1st, 2nd and 3rd level clinics, classrooms, office and support space programs to target improved patient flow, wayfinding, operational efficiency and pedagogical requirements within the available space at 124 Edward Street. In order to achieve Clinic renewal and reorganization, the Master Plan, which was completed in January 2020 by Montgomery Sisam and Kahler Slater, included an 8-stage implementation phasing program.

The first phase of the Master Plan was to implement Medical Device Reprocessing (MDR). At present, instrument reprocessing begins with a manual wash by the dental student or dental assistant. Instruments are then packaged and sterilized in one of five main sterilizers located throughout the building. Following sterilization, instruments are stored in one of the multiple dispensaries that service the clinics. While the standards of instrument sterilization and infection control demanded by the profession are currently met, the 2019 accreditation report requires implementation of central sterilization, a process known as MDR. The MDR unit is responsible for the decontamination, cleaning, preparation, packaging, sterilization and storage of reusable medical devices used in the daily provision of oral health care. The

processing of instruments within the MDR unit must be consistent, reliable and accountable to prevent the transmission of infectious disease during patient care.

In comparison to the decentralized model of instrument reprocessing currently in use, the centralization of reprocessing services is essential in a modern dental facility for three primary reasons:

- reduces the incidence of percutaneous injury to students and staff.
- offers the highest level of accountability, consistency and quality assurance.
- operates at the greater levels of efficiency.

The total project cost for Master Plan and implementation of MDR is \$6.4M including \$1.4M MDR equipment cost. The MDR project is scheduled to be completed and fully functional by early 2022.

The second phases to be undertaken are the implementation of Phases 6, and 7b of the Clinic Master Plan to renovate the Preclinical Simulation Lab 4 and Clinic 2. The project will also include the renovation of key adjacent spaces including the Elm Street Patient entrance and reception (Phase 4) and the addition of an elevator and egress stair to improve vertical connections, accessibility and wayfinding. The project will renovate of 5,160 NASM of Faculty space. Necessary upgrades to building infrastructure, services and energy performance will be included in the renovations.

Renovations to the Pre-Clinical Lab 4 will replace the existing outdated lab benches with 124 new stations equipped for digital dentistry and updated support spaces. Clinic 2 will expand its current space horizontally to encompass the entire north aspect of the second floor and expand vertically to the third floor with the addition of new floor space constructed within the existing double height clinic space to create a Clinic 3. The newly renovated Clinic 2 and new Clinic 3 will consolidate all undergraduate clinical instruction and provide 120 multi-purpose enclosed operatories for patient care. The construction will be phased with completion of Lab 4 renovations expected in September 2023 and completion of Clinic 2 renovations in July 2025. As previously indicated, preliminary total project costs for Pre-Clinical Lab 4 and Clinic 4 are \$12.5M and \$53.3M respectively. These are the Faculty's fundraising priorities.

In response to the Covid-19 pandemic and changes to the RCDSO guidelines for managing infection risks during in-person dental care, the Faculty undertook a project to create a new off-site clinic to meet the urgent need for enclosed operatories to perform aerosol generating procedures.



In November of 2020, CaPS Executive approval was given to create a temporary off-site dental clinic to be operational by September 1, 2021. This Satellite Clinic provides the Faculty of Dentistry and its community of patients with 41 purpose built enclosed operatories and accompanying support spaces. In addition to providing a facility for students to complete their Clinical Hours during the Covid-19 pandemic, the Satellite Clinic will provide the Faculty with the minimum amount of operational swing space to allow the completion of the Clinic 2 renovations and future Master Plan implementation renovations.

## **Updates to Teaching Facilities**

The auditorium located in the lower level of the Dentistry building is the core space for various student activities and events in the building. The Faculty utilizes the space for day to day classes, activities, special events and student-focused initiatives such as alumni/student events and Research Day. It is the largest and only multi-functional space in the Dentistry building but had not had significant improvements in 60 years.

The Faculty of Dentistry identified the auditorium as a priority for renovation and undertook the upgrades in phases. The furniture upgrade was implemented in 2018 adding new mobile tables and chairs to optimize flexibility of the space. In 2020-2021, the Faculty undertook renovations to the space including lighting, AV upgrades and architectural finishes. Lighting and controls in the auditorium were upgraded to be flexible enough to serve multifunctional use of the space, and were updated to modern standards. The AV system was upgraded to a state-of-the-art teaching space meeting university standards. The space was equipped with new electrical receptacles throughout the space, so that students are able to plug in their laptops and to maximize flexibility for activities and events. As part of the architectural upgrades, the walls were replaced with bright, light wood finishes to make the space more inviting for students. Acoustic treatments were added to the space by way of acoustic wall panels and new acoustic ceiling.

Completed in the 2021-2022 school year, the space will now be a more pleasant, inviting with flexible furniture, better lighting, bright and better acoustics and upgraded AV that will positively impact the student experience.

## **11. INTERNAL & 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 over 8,000 alumni through our Advancement and Alumni Relations 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.”* From 2015 to 2017, the dean of Dentistry was 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 has been a member of the Centre for Interprofessional Education governance committee.

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, Mount Sinai Hospital, Sunnybrook Health Sciences Centre, Princess Margaret Cancer Centre, Holland Bloorview Kids Rehabilitation Hospital, Michael Garron Hospital, and Humber River Hospital, 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. Its co-director is Faculty of Dentistry assistant professor Rachael Bosma. 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 Biomedical Engineering (BME).

The Faculty has representation on Governing Council through the election of professor Ernest Lam, who has been a member from 2016. Professor Anil Kishen is a member of Academic Board.

The dean is a member of the Deans of the Single Department Faculties Committee and Academic Board, and in 2021-22, is a member of the Planning Budget Committee.

## **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 (ACFD), the Royal College of Dental Surgeons of Ontario (RCDSO), the National Dental Examining Board of Canada (NDEB), the Royal College of Dentists of Canada (RCDC), and the Ontario Dental Association, among others. It is an affiliate member of the American Dental Education Association. The dean was a member of the board of directors of the ACFD from 2008 – 2021. Professor James Posluns is on the executive of the RCDC, as is instructor Izchak Barzilay. Professors Paul Andrews and Iona Leong are on the RCDC board of directors and instructor John Zarb is its Registrar. For the RCDSO, a number of faculty and instructors serve on its committees. The dean chaired the RCDSO working group on Sedation and Anaesthesia from 2016-2018 which prepared their Standard for the dentists of Ontario (Use of Sedation and General Anaesthesia in Dental Practice), and in 2014-2015 was a one of 5 members of the committee who prepared the Guideline *“The Role of Opioids in the Management of Acute and Chronic Pain in Dental Practice”*. For the NDEB, a number of faculty (dean Haas and professor Posluns) are chief examiners and one (professor Lai) is on its Examination Committee.

Our faculty members have also played major roles in research organizations. Our faculty are active in the Canadian Association for Dental Research (CADR), and professors Anil Kishen and Amir Azarpazoooh are on its board of directors. Our faculty are also active with the International Association of Dental Research (IADR). Of its past presidents, 4 have been from our Faculty, as well as a number of research section presidents, and 8 faculty members have won the IADR Distinguished Scientist Award. The International Association for the Study of Pain has had a past president from our Faculty.

## **Continuing Dental Education**

The Faculty of Dentistry has always considered the provision of quality continuing dental education for the profession as part of its mandate. Continuing Dental Education (CDE) operates on a cost recovery basis with no financial support from the university and it has

been generating revenue for the Faculty. Until 2019, CDE was under the direction of an assistant dean, continuing dental education and professional relations. In 2019, the assistant dean retired, and the position was replaced by a director of CDE. CDE has three full-time staff and three additional part-time staff members who provide onsite and clinical support for various courses. Most CDE courses are held at its offsite facility in the north end of Toronto. Additional sites include the Faculty of Dentistry and other University of Toronto sites.

The majority of the CDE participants are dentists from the province of Ontario. The standard CDE courses typically consists of lectures while some have hands-on sessions. A list of upcoming courses is posted on the CDE website <https://cde.dentistry.utoronto.ca/cde>. Approximately 1500 dentists annually participate in these courses representing about 20% of the practicing dentists in Ontario. CDE also offers online courses through its website, [utooth.ca](http://utooth.ca), with over 6000 registered users. While Covid-19 restrictions saw a decrease in the number of in-person courses, the courses offered virtually increased to close to 40 and course registration doubled to over 7500.

Over the last 5 years, CDE has focused on maintaining its most successful courses while developing new courses and programs based on identified gaps in practice and learning needs of participants. With direction from an advisory committee, CDE has expanded into the international market by offering several new courses for internationally trained dentists and expanded its clinical patient care courses.

CDE courses are offered in a variety of formats. A typical annual offering for standard CDE courses for the 2019/2020 academic year is as follows:

Month	Course Title
September	Soft Tissue Management in Periodontal Surgery
	Dental Practice Management
	Small Field-of-View Cone Beam CT
October	Infection Prevention and Control: A Guide to Best Practices for All Oral Health Care Professionals
	Platelet Rich Fibrin and Guided Bone Regeneration
	Cybersecurity and Maintaining the Integrity of Digital Dental Records
November	Medical Emergencies
	Nitrous Oxide & Oral Sedation
	Restorative Dentistry
	Functional and Esthetic Restorations of Worn Dentition
	Paediatric Dentistry
	“Doctor is it Serious?” A Guide to Diagnosis, Communication and Management of Lesions
December	3D Imaging with CBCT in Endodontics
January	Implant Residency
	The Fundamentals of Dental Office Reprocessing
	Small Field of View Cone Beam CT: Principles & Applications

	Pathophysiology, Pharmacotherapy and Dental Management of the Patient with Common Medical Conditions
	How to Incorporate the New Classification of Periodontal Diseases into Your Practice
	Dentistry's Future: Co-managing Cardiovascular Diseases with Medicine
February	The New Message of Dentistry: How to Effectively Communicate to Patients, Staff & Everyone
	Nitrous Oxide and Oral Sedation Refresher Course
	Dental Marketing and Social Media Fundamentals Update
	CPR Recertification
	The Art and Science of Multiple Veneer Solutions to Common Cosmetic Challenges
	Parenteral Moderate Sedation Refresher Course
March	Fundamentals of Dental Sleep Medicine
	Infection Prevention and Control
April	Medical Emergencies
	Oral Sedation and Nitrous Oxide Sedation
	Conservative Endodontics Utilizing Advanced Tools & Techniques for Maximum Effect
May	The Art and Science of Advanced Cosmetic Dentistry
June	IV Moderate Sedation

In addition to these standard courses, CDE offers several other programs in different formats. CDE has four 12-month programs for internationally trained dentists, three of which were added since 2019. While the programs are designed to provide foreign dentists with the opportunity to enhance their skills and return to their country to make these skills available, Ontario dentists can and have taken these courses. The courses are strictly CDE programs and do not confer any special academic standing to those who complete them. Enrolment for each of the programs is limited to 2 to 4 students.

The programs include the following:

- Advanced Training in Hospital Dentistry program
- Surgical & Prosthetic Implant Treatment Program for Internationally Trained Dentists
- Advanced Training Program in Orofacial Pain Management for Internationally Trained Dentists
- Advanced Training Fellowship in Oral and Maxillofacial Surgery for Internationally Trained Dentists

CDE also offers:

- An implant residency for practicing dentist 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 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.
- One or two Vacation and Learn opportunities; one for adults only and the other is during March break at a family destination.
- A comprehensive on-line continuing education option via [utooth.ca](http://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. Over 50% of the dental profession have used [utooth.ca](http://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 alumni, it also has been a financially rewarding program for the Faculty that has allowed investment in the growth and scope of the overall program.
- Remedial courses are also offered through this department. Clinicians whose knowledge or skills have been found wanting by the regulatory body for dentists, 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](http://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.

To help support the new graduates during the pandemic, CDE, in collaboration with Canada's other dental schools, began offering free CDE courses for the 2020 and 2021 graduates to help support the new graduates. CDE also participated in a joint webinar series in conjunction with the Association for Continuing Dental Education (ACDE), along with 31 of its member schools. The link to the "ACDE Webinar Series" is <https://cde.dentistry.utoronto.ca/cde>.

In 2020 and 2021, CDE helped support the graduate specialty program in periodontics by hosting free webinars called the Oak Seminar Series. Many of the webinars were recorded and are available for free at <https://cde.dentistry.utoronto.ca/oak-seminars>. Each of the 15 webinars had close to 200 participants in attendance, with attendees from over 40 different countries.

## **Alumni Affairs**

Alumni Relations falls under the direction of director of advancement, who oversees a 3-person team, as described in the section on Advancement. The alumni & donor relations officer position contributes to the strategic direction of the Faculty's Advancement portfolio. This role's responsibilities include donor and alumni strategy development and execution, both in digital and in person, content marketing and email marketing, data analytics for social and on-line channels, event execution, management and development of the alumni e-newsletter, as well as our signature Great Alumni Event and virtual events.

The Development Officer Annual and Leadership Giving role contributes to the event programming and alumni and donor engagement by helping with some event execution mainly focused on class giving and reunions and holds the sponsorship portfolio for the student partnership program. This role contributes to the strategic planning for the annual and leadership annual giving campaigns and this is a front-line fundraiser role. As well, this role manages the stewardship reporting process and student awards portfolio to ensure the integrity of donor giving.

All roles in advancement work very closely with the Communications manager with a focus on story development, features, themes that tie into both the Faculty's overarching priorities and Advancement priorities.

## **Alumni Engagement**

Alumni engagement and our alumni community's affinity for the school 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 over time, but it will take years. This still remains a challenge, but innovative story-telling, more digital events, the creation of the alumni e-newsletters, are helping to reach more alumni. Annual surveys are taking place and two years of data have already helped us better understand our alumni base as has analyzing Google analytics and the activity on our social channels. Additionally, this summer, we have hired a market research firm to conduct in depth research with our students, alumni and donors to provide feedback on the motivations and feelings of our key stakeholders. This detail will inform future public narrative to help engage our stakeholders and deepen our relationships.

A second phase of the project will likely need to take place to help create a communications plan for the next campaign to ensure greater likelihood of success.



# 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 Gevik Malkhassian.

## IDAPP Applications, Registration, Offers

	2016	2017	2018	2019	2020	2021
Applications	157	173	181	195	240	211
Offers	30	27	33	29	28	28
Registrations	25	24	24	24	26	26
Registered/Offered Yield	83.3%	88.9%	72.7%	82.6%	92.9%	92.9%

# Dental Specialty Assessment & Training Program (DSATP)

The DSATP is a special university program with an initial assessment for a duration of a maximum of 3 months followed by 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, skills 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). Upon successful completion of this examination, the candidate would be eligible for licensure by one of the Dental Regulatory Authorities.

**DSATP Applications 2016-20**

Year	Anaesth	DPH	Endo	Oral Med	Oral Surg	Ortho	Pedo	Perio	Prostho	Radiology
2016		1	3		2	8				
2017	1		2			10		1	1	1
2018			4		2	1	1			
2019			2		1	12	2	2	1	1
2020			3	1	1	7	2	1	2	2

**DSATP Acceptances 2016-20**

	Anaesth	DPH	Endo	Oral Med	Oral Surg	Ortho	Pedo	Prostho	Radiology
2016 - 20	1	0	5	0	3	6	1	1	1

## **12. FUTURE DIRECTIONS**

## Overview

A new dean will be starting on July 1, 2022, and from that point on, will be leading the future directions for the Faculty. At this time the 2 key challenges that the Faculty faces are related: the need to address financial sustainability and the urgent need for clinic infrastructure renewal.

The plans for enrolment are to maintain current levels in both undergraduate and graduate programs. Complement planning will attempt to maintain the current FTE, after several years of a gradual reduction in an attempt to mitigate financial concerns. New recruitment will follow retirements or departures, and will focus on fields of the greatest need. The balance between tenure and teaching stream will be aligned to support our research and education missions.

## Long-range planning

The 5 directions of the Strategic Plan Update 2019-22 will be used to summarize considerations for our long-range planning.

## Education

Curriculum reassessment and renewal is an ongoing strategy. Similarly, our admissions processes are also undergoing reassessment and renewal, led by the chair of the admissions committee, who is our vice-dean, education. As detailed earlier in this document, EDI initiatives in this regard are already underway.

Both the Strategic Plan Update 2019-22 and the Valachovic-Garner report indicated the benefits of creating an advanced education program in general dentistry (AEGD). At this stage, the Faculty needs to formulate a business plan for implementation.

Another recommendation from the Valachovic-Garner report is to focus more on patient-centred care. As such, we are planning a full-day retreat with our faculty involved in undergraduate teaching to address 3 objectives: 1) improve student learning; 2) enhance patient experience and a higher level of quality and timeliness of care; and 3) improve efficiencies of the clinical operations with an improved financial outcome. It is believed that this retreat will be most effective if done in-person, so this is being planned for later in the 2021-22 year, when we are hopeful that Covid-19 restrictions will allow for an appropriate gathering size.

One other recommendation from the Valachovic-Garner report was to reconsider the requirement that all graduate students enrolled in a clinical specialty program also complete a doctoral-stream M.Sc. degree.

## **Clinical Care**

The urgent need for clinic infrastructure renewal is a priority. Whereas the entire research facility was renovated in 2018, our clinics remain dated. This year has seen the construction of the medical device reprocessor (MDR) and the satellite clinic. Plans for the renovation of the simulation lab (Lab 4) and Clinic 2 are well underway with the hiring of an architectural consultant. Lab 4 is slated for construction in 2022-23 and Clinic 2 (as well as Clinic 3) in 2024-2025. This will be followed by plans for renovation of patient reception areas and the other clinics in later years.

An intramural faculty practice plan should be developed. This is one of the recommendations stemming from the Valachovic-Garner report.

## **Research**

The Strategic Plan Update 2019-22 identified a number of long-term goals related to research. One is exploring the feasibility of a D.D.S.-1 research rotation to expose all new D.D.S. students to the variety of research done and the facilities available at the Faculty.

Another long-term goal is to reassess the research component of clinical graduate training to harvest the full potential of clinical specialty graduate students for bridging the gap between research and clinical practice.

As well, redesigning the research content on the Faculty website and organizing international events in the areas of research strength will help give an international profile.

Future complement planning should aim to strengthen areas of research focus as determined appropriate.

## **Our People**

The Faculty will continue with wellness initiatives for students, faculty, and staff. This is one of the priority working groups for 2021-22. The wellness working group will transition to an overarching oversight committee. Subcommittees will lead wellness initiatives that can

more directly focus on the needs of specific groups: undergraduate students, graduate students, staff, faculty, and instructors.

The other 2021-22 priority working group will see the Diversity, Inclusion, Collegiality, and Equity (DICE) committee evolve into an equity, diversity and inclusion (EDI) committee. Its goals will be to lead discussion and develop strategies on promoting an equitable, inclusive, and diverse environment, and to research and identify initiatives to promote EDI.

There will be a review of the position of director of student life. It has been 7 years since a director of student life was created, and it has been a great success. Yet, just as accreditation is carried out every 7 years, it is time to review this position to see if there are any areas to develop.

The advancement office will continue efforts at alumni engagement, as described in the section on Alumni Affairs.

## **Strengthen our Organizational Impact**

Financial sustainability is a major concern. This was the rationale for commissioning the 2021 review entitled Re-Envisioning Dental Education at The University of Toronto, carried out by Dr. Richard Valachovic and Sally Garner. We will consider their recommendations, which include: making the graduate specialty program directors more accountable for their budgetary decisions; pursuing an intramural practice; initiating an AEGD; and promoting the Faculty of Dentistry as a “front porch” of UofT and a safety net provided as a means to engage with government priorities.

Government advocacy will be needed to pursue the possibility of increasing provincial clinical education funding and support for our clinical infrastructure renewal. Given our patient demographic – which is disproportionately made up of the working poor – we are serving the disadvantaged population of the Greater Toronto Area. As such, we need to convince policy makers of the value of our clinical service to the public.

We will continue to pursue alternative sources of funding. One example where we have done this successfully is our agreement signed in 2019 with the State of Kuwait. This will see the Faculty accept Kuwaiti citizens who meet a minimum academic standard into our D.D.S. degree program following a minimum of 3 years pre-dentistry university training in the Faculty of Arts and Science at the university. These students would pay international tuition in addition to an annual support fee. The first students were to have started at the Faculty of Arts and Science in September 2020, but unfortunately, Covid-19 restrictions has delayed this. The first students are now scheduled to be eligible to begin the D.D.S. program in

September 2025. This will offer some financial relief for the Faculty of Dentistry in the very long term.

# APPENDICES

- Appendix 1 Previous UTQAP External Review 2016-2017
- Appendix 2 Response to Previous UTQAP External Review 2017
- Appendix 3 Strategic Plan 2014-2019
- Appendix 4 Strategic Plan Update 2019-2022
- Appendix 5 Strategic Plan Update First Year Progress Report 2019-2020
- Appendix 6 Strategic Plan Update Second Year Progress Report 2020-2021
- Appendix 7 Dean's Annual Reports 2019-20, 2020-2021
- Appendix 8 Faculty Awards and Honours
- Appendix 9 Association of Canadian Faculties of Dentistry (ACFD) Competency Framework
- Appendix 10 Commission on Dental Accreditation of Canada (CDAC) Requirements for D.D.S./D.M.D. programs (Degree Level Expectations)
- Appendix 11 Undergraduate Course List
- Appendix 12 Undergraduate Curriculum Map 2021
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- Appendix 14 Graduate specialty programs CDAC requirements (degree-level expectations)
- Appendix 15 Graduate Course List
- Appendix 16 Graduate Curriculum Maps
- Appendix 17 Graduate Survey 2019
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Appendix 19 Faculty CVs

Appendix 20 Clinic Operations External Review 2018

Appendix 21 Student Services Statement

Appendix 22 Student Services External Review 2017

Appendix 23 Library Report

Appendix 24 Continuing Dental Education External Review 2018

Appendix 25 Valachovic-Garner Report 2021