2016-2017

DMSc Student Research Guidebook

OFFICE OF RESEARCH OVERVIEW & CONTACTS

Research activities at the Harvard School of Dental Medicine aim to set the international standard and pace for basic discoveries, clinical application, and research training in an area that lies at the heart of dental medicine. By leveraging its scientific strengths and focusing on the area of skeletal development, growth and homeostasis, as well as clinical and health policy research, Harvard School of Dental Medicine has established a strategic direction for its research programs. Exciting opportunities, both scientific and organizational, are on the horizon for clinical and translational research in areas where we already have basic science strength. As the only School within Harvard University with its own clinical facility, Harvard School of Dental Medicine continues to differentiate itself through a unique emphasis on basic and clinical research combined with exemplary patient care and education. Below are several people you will get to know in the HSDM Office of Research. Please do not hesitate to contact any of us with questions or concerns regarding your project and/or research requirements at HSDM. Our offices are located on the fourth floor of the REB.

DR. BJORN R. OLSEN, Dean and Professor (bjorn_olsen@hms.harvard.edu) 617-432-1874

DAWN DECOSTA, Administrative Director (dawn_decosta@hsdm.harvard.edu) 617-432-1121

LEANNE JACOBELLIS, Coordinator (leanne_jaocobellis@hsdm.harvard.edu) 617-432-5743

DMSc STUDENT RESEARCH GUIDEBOOK

Table of Contents

Pages 1-2	Office of Research Contacts and Table of Contents
Pages 3-4	DMSc Important Deadlines: class of 2017, 2018, 2019 and 2020
Page 5	Introduction to Research course
Page 5	AGE Research Seminar Series course
Page 6	NIH-Formatted Research Proposal and Exam (class of 2018 only)
Page 7	Academic, Professional, and Scientific Conduct
Page 8	Submitting a Grant Application
Page 8	HSDM Student Research Day
Page 8	Guidelines for Research Day Abstracts and Posters
Page 9	Funding for Research Travel and Poster Printing
Page 9	IRB/IACUC Approval Process
Page 9	Research Mentors
Page 10	Core Research Facilities
Pages 10-14	DMSc Thesis Project and Proposal
Page 14	Publication Requirements
Page 15	DMSc Thesis Advisory Committee Approval Form
Page 16	DMSc Thesis Proposal Summary Approval Form
Page 17	DMSc Thesis Advisory Committee Schedule Form
Page 18	Abstract Format for Student Research Day
Page 19	Sample Student Research Day Abstract
Page 20	NIH-Formatted Research Proposal Signature Sheet
Page 21	NIH-Formatted Research Proposal Check-In Form
Page 22	NIH-Formatted Research Proposal Examination Grading Sheet
Page 23	Application for Research Travel Funds

IMPORTANT DMSc DEADLINES

DMSc Class of 2017

IMPORTANT DEADLINES

February 3, 2017	Deadline for submission of abstract for Defense Committee Selection
March 2017	Convene Thesis Advisory Committee
March 10, 2017	Deadline for submission of abstract for HSDM Student Research Day
April 19 – 20, 2017	Present a poster at Student Research Day
April 21, 2017	Thesis Defense Deadline
May 1, 2017	Final Thesis Submission Deadline

ADVANCED GRADUATE EDUCATION RESEARCH SEMINAR SERIES

You must attend each class session between and present your research on a date TBA.

HSDM STUDENT RESEARCH DAY

You must present a poster at HSDM Student Research Day. This year's event is a 2-day event on April 19 & 20, 2016.

INDIVIDUAL PROGRAM RESEARCH REQUIREMENTS

Please see your Program Director as each Program has specific guidelines tracked through their office.

DMSc Class of 2018

IMPORTANT DEADLINES

October 7, 2016	Deadline for Approval of Thesis Advisory Committee
December 2, 2016	Deadline for Approval of Thesis Proposal
March 2017	Convene Thesis Advisory Committee
September 2017	Convene Thesis Advisory Committee

ADVANCED GRADUATE EDUCATION RESEARCH SEMINAR SERIES

You must attend each class session.

HSDM STUDENT RESEARCH DAY

You must attend HSDM Student Research Day on April 19 & 20, 2016.

INDIVIDUAL PROGRAM RESEARCH REQUIREMENTS

Please see your Program Director as each Program has specific guidelines tracked through their office.

IMPORTANT DMSc DEADLINES, continued

DMSc Class of 2019

IMPORTANT DEADLINES

The approval of your Oral Qualifying Committee must take place in April 2017.

NIH-FORMATTED RESEARCH PROPOSAL EXAMINATION

Draft proposal submission deadline, emailed to Dawn DeCosta, is February 3, 2017.
Proposal check-in meetings with examiners will be February 13-20, 2017.
Final proposal submission deadline, emailed to Dawn DeCosta and your examiners, is March 3, 2017.
Proposal examinations will take place March 13-24, 2017.

ADVANCED GRADUATE EDUCATION RESEARCH SEMINAR SERIES

You must attend each class session.

HSDM STUDENT RESEARCH DAY

You must attend HSDM Student Research Day on April 19 & 20, 2017.

INDIVIDUAL PROGRAM RESEARCH REQUIREMENTS

Please see your Program Director as each Program has specific guidelines tracked through their office.

DMSc Class of 2020

INTRODUCTION TO RESEARCH COURSE

You must attend all class sessions (August – December 2016), Mondays 3-5pm.

NIH-FORMATTED RESEARCH PROPOSAL EXAMINATION

Your NIH proposal exam will be held in the spring semester of your second year.

ADVANCED GRADUATE EDUCATION RESEARCH SEMINAR SERIES

You must attend each class session.

STUDENT RESEARCH DAY

You must attend HSDM Student Research Day on April 19 & 20, 2017.

INDIVIDUAL PROGRAM RESEARCH REQUIREMENTS

Please see your Program Director as each Program has specific guidelines tracked through their office.

INTRODUCTION TO RESEARCH COURSE

The goal of this course is to guide MMSc, DMSc, and PhD students through an introduction to research from a broad scientific perspective. Each of the course sessions will be taught by different postdoctoral fellows and faculty members and based on a chapter in *Research in Medical and Biological Sciences* which will be distributed to each student. Seasoned researchers will share tips from personal experiences with successful grant writing and will answer questions that students have regarding challenges that they are facing in their own proposal writing.

This course, taken in DMSc students' first year of study, is mandatory for all HSDM DMSc students, and attendance in all classes is required to pass this course. Grading is on a pass-fail basis and is based on class participation. You may request an excused absence by emailing Dawn DeCosta with the course date you will miss and why. The Dean for Research will decide if your absence is approved. More than one unexcused absence will result in a failing grade and you will have to repeat the course next year.

The course will meet during the fall semester on Mondays from 3-5pm in the REB auditorium on the following dates:

- August 29
- September 12
- September 19
- September 26
- October 3
- October 17
- October 24
- November 7
- November 14
- November 21
- November 28
- December 5
- December 12

AGE RESEARCH SEMINAR SERIES

The AGE Research Seminar Series is mandatory for all AGE students. The class will meet in both fall and spring semester on Thursday afternoons from 5:00-6:00pm in the REB auditorium (unless otherwise noted). The course director is Dr. Joshua Chou <Joshua_Chou@hsdm.harvard.edu>. **Course dates are the same as the Multidisciplinary Case Presentation Seminar dates.**

The goal of the AGE Research Seminar Series is for DMSc, MMSc, and selected Certificate candidates to share their current research with faculty, students, and staff from all departments of HSDM. The seminars provide students with the chance for academic and research exchange among the different departments. This course is mandatory for all Advanced Graduate Education students and attendance is therefore mandatory. Graduating DMSc students (class of 2017) are required to prepare an abstract summarizing their research that will be distributed one week prior to their scheduled presentation. Each oral presentation is scheduled for 20 minutes, plus 10 minutes for questions. Presenters are encouraged to elicit feedback from faculty. Mentors are expected to attend on the day of their student's presentation. Grading is on a pass-fail basis and is based on class participation.

Absences: You may request an excused absence by writing to leanne_jacobellis@hsdm.harvard.edu with the course date you will miss and why. The Course Director will decide if your absence is approved**. More than one unexcused absence will result in a failing grade.**

NIH-FORMATTED RESEARCH PROPOSAL AND EXAM

DMSc Class of 2018 only

Your NIH-formatted proposal will be due in the spring of your second year, March 2017, and your exam will follow in April 2017. This information is included here for your future planning purposes.

The NIH-formatted **proposal** should follow the NIH format below (approximately 12 single spaced pages total). The proposal would in most cases describe a testable hypothesis based on evaluation of the relevant literature, describe critical experiments to test the hypothesis, describe interpretation of expected outcomes, and discuss alternative strategies should problems arise. If you would like to see examples from previous years, please see Dawn DeCosta. The format follows a typical NIH proposal and includes the following:

1. Specific Aims
2. Research Strategy
    a. Significance
    b. Innovation
    c. Approach
3. Literature Cited

Please see specific deadlines on page 4 and note that the NIH-formatted proposal must be approved by your Program Director and Research Mentor before submission to the Office of Research. The signature sheet is provided in this Guidebook (page 20). The Office of Research will assign two members of the DMSc Examination Committee to review your proposal. You will have a check-in meeting with your examiners after the submission of your proposal, which must adhere to the format listed above. The purpose of this check-in meeting is for you to obtain critical feedback and suggestions prior to your examination. Based on the examiner's feedback, you must submit a revised proposal to Dawn DeCosta and to your examiners by March 3, 2017. If you do not adhere to these guidelines you will receive an automatic fail.

The primary goal of the NIH-Formatted Research Proposal **examination** is to evaluate the student's ability and potential for entering the world of original scholarship and/or experimentation. A large attribute for success in one's future professional/academic career is the ability to identify and define a specific testable hypothesis based on evaluation of the relevant literature, to propose critical experiments to test the hypothesis, and to interpret the outcomes in a way that indicates awareness of the limitation of the methods used. You will be examined on your proposal (about 1 hour) in front of 2 members of the DMSc Examination Committee. The Office of Research will assign examiners and schedule this for you. You must bring a copy of the NIH-Formatted Research Proposal Examination Grading Sheet (page 21) to your exam. Please note that if you are 15 or more minutes late to your exam, you will receive an automatic fail.

1. Please be prepared to give a 10 minute overview of your project (you may use a PowerPoint presentation if you like)
2. Discuss why you chose this project/topic
3. Invite questions from the reviewers
4. Be prepared to answer questions regarding:
    a. the significance of your research questions
    b. the specific aims
    c. the selected methods (i.e. what would you do if the experiments do not work out as planned)?
    d. the expected outcomes i.e. what would the implications of successful outcomes be for the field or specialty?

ACADEMIC, PROFESSIONAL, AND SCIENTIFIC CONDUCT

PREPARATION OF PAPERS AND OTHER WORK

All homework assignments, projects, lab reports, papers and examinations submitted for a course are expected to be the student's own work. Students should always take great care to distinguish their own ideas and knowledge from information derived from other sources. The term "sources" includes not only published or electronic primary and secondary material, but also information and opinions gained directly from other people. It is each student's responsibility to understand the expectations of academic integrity, proper forms of citation and submission of one's own work. In addition, collaboration in the completion of assignments is prohibited unless explicitly permitted by the instructor, in which case it must be acknowledged.

AUTHORSHIP GUIDELINES

Authorship is an explicit way of assigning responsibility and giving credit for intellectual work. The two are linked. Authorship practices should be judged by how honestly they reflect actual contributions to the final product. Authorship is important to the reputation, academic promotion, and grant support of the individuals involved, as well as to the strength and reputation of their institution. The Faculty Council of Harvard Medical School has endorsed the following statement. Although authorship practices differ from one setting to another, and individual situations often require judgment, variation in practices should be within these basic guidelines.

- Everyone who is listed as an author should have made a substantial, direct, intellectual contribution to the work. For example (in the case of a research report) they should have contributed to the conception, design, analysis and/or interpretation of data. Honorary or guest authorship is not acceptable. Acquisition of funding and provision of technical services, patients, or materials, while they may be essential to the work, are not in themselves sufficient contributions to justify authorship.

- Everyone who has made substantial intellectual contributions to the work should be an author. Everyone who has made other substantial contributions should be acknowledged.

- When research is done by teams whose members are highly specialized, individual's contributions and responsibility may be limited to specific aspects of the work.

- All authors should participate in writing the manuscript by reviewing drafts and approving the final version.

- One author should take primary responsibility for the work as a whole even if he or she does not have an in-depth understanding of every part of the work.

EXAMINATION RULES

In order to avoid improper behavior during an examination, students should refrain from communication with other students while an exam is in progress. They should neither retain nor refer to any books, papers or other resources during an examination except with the express permission of the instructor. For violation of the examination rules or dishonesty in an examination a student may be required to withdraw from the Dental School. Students who fail to obey the instructions of an examination proctor are liable to disciplinary action.

SCIENTIFIC INTEGRITY

In setting standards of practice for scientific and clinical research, the Faculty of Medicine at Harvard University has endorsed several guidelines or procedures which relate to ethical conduct. Students who perform research are advised to familiarize themselves with these policies in order to perform research of the highest integrity. This information is available in the document, *Faculty Policies on Integrity in Science*, which may be obtained on the web at *http://hms.harvard.edu/content/faculty-policies-integrity-science*.

SUBMITTING A GRANT APPLICATION

If you plan on submitting a grant application, please work with the Office of Administration and Finance. They must be notified prior to the submission deadline. All grant applications must be approved through the Office of Administration and Finance as well as your Program Director prior to submission. This pertains to all funding (including but not limited to government awards, foundation awards, dental society awards) even if they do not require institutional approval. If you have any questions about this policy, please contact andrea_morris@hsdm.harvard.edu.

HSDM STUDENT RESEARCH DAY

Implemented in 1998, Student Research Day at Harvard School of Dental Medicine is an annual event held each April. For the past 15 years, this program has grown exponentially. The primary focus of this all day event is for graduating DMD, MMSc, and DMSc students to showcase their research to faculty as well as fellow students at Harvard School of Dental Medicine, the Forsyth Institute, and Harvard Medical School. Please note that Research Day is a mandatory event and all students must attend regardless of whether or not they are presenting a poster.

Graduating students present a research poster to faculty who in turn evaluate their work. Faculty reviewers look at six criteria when evaluating posters:

1. Student's ability to describe the work and its significance;
2. Organization and clarity of the poster presentation;
3. Introduction and formulation of hypothesis and scientific method;
4. Quality and extent of work done by the student;
5. Student's overall understanding of the project; and
6. Overall evaluation of the poster and presentation.

HSDM STUDENT RESEARCH DAY GUIDELINES: Abstracts

All students presenting a poster at this year's 2-day 2017 Research Day must submit an abstract (400 words maximum) of their research to the Office of Research for inclusion in an abstract book. Please email your abstract in the format specified in this Guidebook (pages 18-19) to Leanne Jacobellis **by March 10, 2017 at the latest**.

Your abstract should include brief sections that clearly and concisely describe:

1. Significance and background of the study
2. Innovation
3. Approach (experimental design, expected outcomes and interpretation)
4. Results
5. Conclusions

HSDM STUDENT RESEARCH DAY GUIDELINES: Posters

All DMSc students must present a poster at this year's 2-day Student Research Day prior to graduation. For Research Day 2017, we will be using electronic posterboards. *You will not need a printed poster*; instead, you will be able to plug a flash drive into your e- posterboard to display PowerPoint, Keynote, PDF, or media files. Please see http://eposterboards.com/formatting-options/ for information on poster file formatting.

POSTER LAYOUT

Keep in mind that the poster is a guide for your verbal "talking-points," therefore the best use of space is usually for an abstract, minimal bulleted highlights of your project (e.g.: Specific Aims, Significance, Innovation, Approach, Results, Conclusions, References) and multiple graphics. It is a good idea to include the abstract at the beginning.

FUNDING FOR RESEARCH TRAVEL AND POSTER PRINTING

If you present a research poster at a national or international conference, then you are eligible to apply for a $500 travel stipend and poster printing through the Office of Research. Please note, students may receive one travel award per fiscal year (July 1-June 30). Please complete an Application for Research Travel Funds (page 23) to apply.

TRAVEL AWARDS: Travel awards are in the form of reimbursement (after travel is complete) by check. ***You must submit all receipts in your name confirming you are the purchaser***. Should you choose to split/share travel expenses with another student, we recommend you pay for your portion (easily done with credit cards) and get documented confirmation of it so you can submit proof of your share. ***You will not be reimbursed for shared costs with another student who has paid an entire bill/invoice in their name.*** If it is not possible for the vendor to split a transaction and one person must front an entire cost, it will be up to you and your travel partner to make personal arrangements on how to transfer costs/money between yourselves. Harvard can only reimburse costs to the actual documented purchaser.

POSTER PRINTING: If you need to present a poster at a research event and your Mentor/PI does not have resources to pay for your poster printing, the HSDM Office of Research will reimburse you for the printing of your poster. We recommend using phdposters.com for printing. Please follow the guidelines on their site. You will be able to pick up your poster at 375 Longwood Ave. (If you submit your poster using your @hsdm.harvard.edu email, or any harvard.edu account, you should not be charged tax. We are unable to reimburse any shipping fees or rush charges.) Please complete an Application for Research Travel Funds (page 24) to request reimbursement.

IRB/IACUC APPROVAL PROCESS

HMS and HSDM students conduct independent research projects, and thus the Committee on Human Subjects (CHS) allows these students to serve as Principal Investigators on their own studies. If appropriate, students may be added to their Mentor/PI's protocol instead of submitting their own application. Student research must meet minimal risk exemption or expedited review criteria (though some minimal risk studies may require full CHS review depending on the research topic, activities, population and/or location). HMS and HSDM students are subject to the same policies, guidelines and regulations as the Faculty of Medicine conducting their own research projects for which they either receive funding through or from HMS or HSDM, or students who receive no funding but are working as an "agent" of HMS or HSDM, must receive approval from the CHS. Additionally, students who receive funding through or from HMS or HSDM to work as personnel on a research project must receive approval from the CHS. Harvard University requires that all researchers with human subjects responsibilities complete a human subjects protection training course at least every two years. Students must complete the mandatory online IRB training even if they are working on their Mentor/Principal Investigator's protocol. See http://www.hms.harvard.edu/orsp/human/human.html for more information.

RESEARCH MENTORS

Students have chosen research mentors at HSDM, The Forsyth Institute, as well as throughout the Longwood Medical Area and beyond. Mentor information may be found at Harvard Catalyst Profiles: connects.catalyst.harvard.edu/PROFILES. The importance of mentor and project selection should not be overlooked: they are crucial to the quality of your experience and the successful completion of your requirements. Thus, you should expect to devote a considerable amount of time to this step, critically assessing the research environment offered by the mentor. Clearly, you should find the proposed project interesting and important. Beyond that, it is essential that the specific aims of the project be clearly delineated and feasible within the available timeframe. The mentor should have the resources to enable you to achieve the specific aims. If your project involves human subjects, you should ask whether the mentor has obtained the necessary IRB approval. If the mentor has not obtained approval, you should plan for additional time so that the mentor can obtain such approval. Remember that no research involving human subjects can be started before the project has received IRB approval. Ideally, a mentor will have demonstrated productivity by a record of publication and a record of private or public funding in a given area. A mentor does not have to be in the field of dentistry.

CORE RESEARCH FACILITIES

There are numerous core research facilities available in the Longwood Medical Area. These cores are listed on the HSDM Office of Research website at http://www.hsdm.harvard.edu/depts/research/Hmsareacores.html. Please contact Jim McBride (jim_mcbride@hsdm.harvard.edu), Director of Core Labs at HSDM, if you are interested in learning more about our facilities or have questions regarding facilities, equipment, or training. It is important to note that you must be trained to use equipment and access laboratories at HSDM.

DMSc THESIS PROJECT AND PROPOSAL

Under the guidance of the Office of Research, students will identify a research mentor and project. Once a project has been approved, a Thesis Advisory Committee should be convened to review the proposed project and to make constructive suggestions for improvement in the design, methodology, etc. The Advising Committee should meet at least twice a year to advise and counsel students on their projects and to evaluate a student's progress on the research. The membership of the Thesis Advisory Committee must be approved by the Dean for Research. Eighteen months prior to graduation and after the completion of the Oral Qualifying Exam, DMSc degree candidates must make a formal presentation of a complete research proposal to the Advisory Committee. The purpose of the proposal is to ensure that the student has a firm understanding of the problem under investigation and to crystallize the hypotheses/objective of the project. The proposal document contains:

1) A concise (5-10 page) review of the pertinent literature
2) A statement of the problem/hypothesis and the specific aims of the project
3) Any preliminary results generated to date
4) A description of the proposed studies, including methods to be utilized

The entire document should be approximately 20 double-spaced pages in length. It will serve as the framework for the thesis, so that effort spent in producing the proposal is not wasted. The proposal must be distributed to Committee members at least 10 days prior to the meeting, and the meeting is held at the School. The meeting opens with a 20-25 minute overview presentation by the student, with slides or computer graphics, and is followed by a general discussion period. The proposal meeting should not be viewed as a major hurdle by the student, but rather as a forum for the constructive exchange of ideas.

THESIS ADVISORY COMMITTEE

The Thesis Advisory Committee advises and counsels students on their projects. This role begins with a student's presentation of his or her thesis proposal to the committee. The Thesis Advisory Committee is comprised of a minimum of three full-time faculty members, one of whom works outside of HSDM. Please note that 2 of the 3 Thesis Advisory Committee members must be Associate Professors or Professors. Exceptions will be considered on a case by case basis. Part-time faculty or outside experts may serve on the committee based upon the nature of the project and the individual's area of expertise. All members of the committee should be well acquainted with the student's area of research. The one non-HSDM member should be appointed in a preclinical science department of the Faculty of Medicine, the Faculty of Public Health, or the Massachusetts Institute of Technology (if the research is related to biomaterials or bioengineering). The research mentor and program director will be non-voting members of the Committee and do not serve as official readers. The membership of the Thesis Advisory Committee must be approved by the Program Director and the Dean for Research before a meeting is convened. Students may be asked to obtain CV's for individuals who are not affiliated with Harvard University or are new to the AGE Research process. Students must obtain approval before any meeting is scheduled.

THESIS DEFENSE COMMITTEE

At the point when the student has completed his or her research, the Thesis Defense Committee will be formed. The Defense Committee should be similar in composition to the Thesis Advisory Committee, however the membership of the Defense Committee must be different from that of the Advisory Committee. Please note that 2 of the 3 Thesis Defense Committee members must be Associate Professors or Professors. There may be carried over from the Advisory to the Defense Committee, however there must be two new readers. In addition, program directors and research mentors cannot serve as official members of the Defense Committee. The membership of the Thesis Defense Committee must be approved by the Program Director and the Dean for Research before a meeting is convened. Students may be asked to obtain CV's for individuals who are not affiliated with Harvard University or are new to the AGE Research process. Students must obtain approval before any meeting is scheduled.

THESIS DEFENSE

When the research mentor determines that the student has completed his/her research project, the student must generate a research thesis. The student should schedule a meeting of the Thesis Defense Committee, as the thesis nears completion. At least 2 weeks prior to the meeting, the thesis must be distributed to members of the Committee. In addition, the Office of Research must be notified, in writing, as to the date, time, and location of the Thesis Defense as well as the membership of the Thesis Defense Committee. The defense follows a format similar to the proposal meeting and includes a slide or computer presentation by the student and a period for questioning and discussion. At the conclusion of the defense, the candidate is excused from the room while the Committee votes on the acceptability of the thesis.

THESIS SUBMISSION

Specific changes in the written document are often recommended by Committee members. These must be incorporated into a revised version of the thesis, which is then circulated among Committee members for final approval. If the thesis is unacceptable, the student is expected to carry out additional experiments, make recommended changes, submit a revised thesis, and reconvene the Thesis Defense Committee at a later date. When final corrections or modifications have been made and the approval page signed, the original thesis and three copies should be turned in to the Office of Research to be bound. The original will be filed electronically (see page 14).

ORAL QUALIFYING EXAMINATION COMMITTEE

Following completion of the majority of the didactic requirements, approximately at the end of Year 2, DMSc candidates must satisfactorily complete an Oral Qualifying Examination. The examination committee members are selected by the student in consultation with their research mentor, the Office of Advanced Graduate Education, and the Program Director. The Committee consists of at least three examiners, two with expertise in different areas of oral biology, and a third with expertise in the student's area of research specialization. Please note that 2 of the 3 Thesis Advisory Committee members must be Associate Professors or Professors. The research mentor and program director can be present for the exam but are not voting members of the Committee. The oral qualifying exam should be approximately 1-2 hours in length. The subject matter varies depending upon the fellow's coursework and area of interest but should not be limited to the fellow's area of research. The membership of the Oral Qualifying Committee must be approved by the Program Director and the Director of Advanced Graduate Education before a meeting is convened. Students may be asked to obtain CV's for individuals who are not affiliated with Harvard University or are new to Harvard. Committee members must be approved by Lynn Dunham in the HSDM Office of Dental Education before an exam is scheduled. Once the committee has been chosen and the exam scheduled, the Assistant Registrar must be notified in writing of the date, time, location, and names of the Committee members at least one week prior to the exam and a signature sheet will be generated. Students who fail a part(s) or all of an oral qualifying exam must complete a make-up exam within 6 months of the original exam. Failure to do so will require that a student re-take the exam in its entirety with a new Oral Qualifying Exam Committee.

THESIS GUIDELINES

The thesis format is similar to that of a manuscript to be submitted to a scholarly journal. If you would like to see examples, please contact Dawn DeCosta. You should plan to include the following elements:

- Title Page
- Signature Page
- Table of Contents
- Abstract
- Hypothesis and Specific Aims
- Research Strategy: Significance, Innovation, Approach
- Conclusions
- References
- Figures and Tables

TITLE PAGE SAMPLE

Project Title

A Thesis Presented by

Full Name, including Middle Name of Author with No Abbreviations
to
The Faculty of Medicine
in partial fulfillment of the requirements
for the degree of
Doctor of Medical Sciences

Research Mentor: Name, Title
Institutional affiliation if other than HSDM

Harvard School of Dental Medicine
Boston, Massachusetts

Month and Year of Submission

SIGNATURE PAGE

A customizable signature page may be found online:
http://hsdm.harvard.edu/index.php/research/research_guidebooks.

COPYRIGHT STATEMENT

This page will be available in the online thesis submission program.

TABLE OF CONTENTS

To assist the reader, the table of contents should indicate the location of each section of the thesis. If you have a large number of figures and tables you should number those and indicate their location as well. Page numbering is to begin with the title page and progress to the end of the references. The number "1" should not appear on the title page.

ABSTRACT

1. The abstract must contain a brief statement of
    a. The objectives of the investigation,
    b. Experimental methods used,
    c. Essential results, including data and, where appropriate, statistics,
    d. Conclusions (underlined), and
    e. Name of supporting agency and grant number (if any).

2. Do not include illustrations or photos. Tables, charts, and columns may be used; however, these must be the same font size as the body of the abstract. It is not acceptable to say that results will be presented and/or discussed.

3. All drugs and materials must be identified both in the abstract and during the presentation.

4. If your abstract includes research based on a commercial product, you may mention the brand name of the product only once in the abstract.

HYPOTHESIS AND SPECIFIC AIMS

The hypothesis should be formulated in a single sentence indicating what is known in the field and how the student believes that the state of knowledge could be advanced or refined by his/her research. The specific aims should be formulated in a short paragraph to explain the means of examining this hypothesis.

RESEARCH STRATEGY: SIGNIFICANCE, INNOVATION, APPROACH

Please refer to NIH PHS instructions.

CONCLUSIONS

The conclusions are to be listed or recorded in as brief and clear fashion as possible. This may be done in one or several small descriptive sentences or paragraphs.

REFERENCES

All published references are to be cited in the text and numbered consecutively in this section. No references should be cited in the abstract. Each reference should be cited only once; on subsequent citations, the original number is used. Personal communications and unpublished data should not be numbered, but should be cited in the text as follows: (G. Edmunds, D.D.S., oral communication, November 1997).

FIGURES AND TABLES

Figures and tables may be included in the body of the thesis or attached as an appendix at the end of the thesis. All figures and tables should be numbered appropriately and referenced in the table of contents for easy identification.

USE OF PUBLISHED PAPERS

Where full-length papers have been published or have been accepted for publication in referred journals during a fellow's academic program at Harvard, he/she may request permission, with the approval of his/her mentor, to include them in partial fulfillment of the thesis requirement. Permission is to be requested from the Office of Research and must be accompanied by a copy of the paper(s) and a note of support from the mentor. When such approval is granted, the papers are to be included in a general thesis format. Since research journals do not permit extensive reviews of the literature and discussions, the thesis must begin with a full review of the literature, a description of the continuity in hypothesis-formulation and problem-solving sequence from one paper to the next and must be completed by a full-length discussion, conclusions and summary. Please contact the Office of Research if you have specific questions.

BINDING YOUR THESES

Harvard now requires students to submit a digital copy of your final accepted thesis to the University. Instead of submitting paper copies of your thesis, as in the past, you will be submitting a final PDF copy using Harvard's new Electronic Theses and Dissertations (ETD) system, **ETDs @ Harvard.** The permanent link for this system is: http://etds.lib.harvard.edu/hsdm/. In the text that follows, we are providing HSDM-specific guidance for the submission process, adapted from more general Harvard-wide instructions. You should only have to use the system once, and this process should take 10-15 minutes. You will access ETDs @ Harvard using your Harvard ID login and PIN. You will be prompted to enter basic data on five screens, including author information, the text of your abstract, a PDF of your thesis, and more. You will then upload your thesis as a single PDF file. Once you submit your work through ETDs @ Harvard and the Office of Research has approved it, then the data and files will be shared with several downstream systems:

DASH Repository at Harvard
Your work will be sent to DASH (Digital Access to Scholarship at Harvard), Harvard's digital repository. Search engines index DASH, which means your work is more discoverable and more likely to be used. You will be making DASH access decisions for your work at the point of submission via ETDs @ Harvard.

HOLLIS
The metadata about your work will be sent to HOLLIS. This will make your work discoverable in the Harvard Library catalog.

DRS2
Your work will be preserved in Harvard Library's digital preservation repository.

PUBLICATION REQUIREMENTS

DMSc students must have a minimum of 3 publications prior to graduation. The publications should be in publishable format or submitted (they do not actually have to be published prior to graduation).

As part of fulfilling this requirement the 3 publications may include:
1) An abstract from a national meeting
2) An original article, and
3) Another publication (proceeding, review, chapter, editorial).
Note: publication guidelines should follow that of a journal article (see specific journal for guidelines and see examples below). Please contact the Office of Research if you have specific questions.

HSDM DMSc STUDENTS

DMSc Thesis Advisory Committee Approval

STUDENT

MENTOR

PROJECT TITLE

PROPOSED THESIS ADVISORY COMMITTEE MEMBERS

The Thesis Advisory Committee is comprised of a minimum of three full-time faculty members, one of whom works outside of HSDM. Please note, 2 of 3 of the members must be Associate Professors or Professors. Exceptions will be reviewed on a case by case basis. Part-time faculty or outside experts may serve on the committee based upon the nature of the project and the individual's area of expertise. All members of the committee should be well acquainted with the student's area of research. The one non-HSDM member should be appointed in a pre-clinical science department of the Faculty of Medicine, the Faculty of Public Health, or the Massachusetts Institute of Technology (if the research is related to biomaterials or bioengineering). The research mentor and program director will be non-voting members of the Committee and do not serve as official readers.

PLEASE PRINT THE NAMES AND TITLES OF THE MEMBERS OF YOUR THESIS ADVISORY COMMITTEE

Please indicate who the chair of the committee is with an asterisk (*)

THIS THESIS ADVISORY COMMITTEE IS APPROVED:

PROGRAM DIRECTOR **DATE**

DEAN FOR RESEARCH **DATE**

HSDM DMSc STUDENTS

DMSc Thesis Proposal Summary Approval

STUDENT

MENTOR

PROJECT TITLE

THESIS ADVISORY COMMITTEE MEMBERS (PRINT NAME AND SIGN)

MEETING DATE

☐ **APPROVE THESIS PROPOSAL**

☐ **APPROVE THESIS PROPOSAL WITH THE FOLLOWING RECOMMENDATIONS**

☐ **DISAPPROVE THESIS PROPOSAL FOR THE FOLLOWING REASONS**

Please return to the Office of Research (REB Room 404) at the conclusion of the thesis proposal meeting.

HSDM DMSc STUDENTS

DMSc Thesis Advisory Committee Schedule

It is recommended that DMSc students meet with their Thesis Advisory Committee at least two times a year beginning in year 3. Please submit your meeting dates to the Office of Research.

STUDENT

MENTOR

PROJECT TITLE

THESIS ADVISORY COMMITTEE MEMBERS

MEETING DATE GUIDELINES

Year 3 Fall

Year 3 Spring

Year 4 Fall

Year 4 Spring

HSDM DMSc STUDENTS

HSDM Student Research Day Abstract Book Format

ABSTRACTS THAT DO NOT FOLLOW THIS FORMAT WILL NOT BE ACCEPTED AND MUST BE CORRECTED BY THE STUDENTS. Please see the sample abstract on the following page for an example of correct formatting.

1. Margins must be 2 inches on all four sides.

2. Justify abstract text paragraphs (block style).

3. Use Times New Roman 9 only. Do not use all caps.

4. The abstract title must not exceed two lines and must be a maximum of fifteen words. Double space after the abstract title. Bold and center all this information.

Type your name, then single space.
Type "Harvard School of Dental Medicine, DMSc (your specialty, i.e. Periodontology, Orthodontics)" class of [your year of anticipated graduation] on one line, then double space.

Type the name and degrees (eg DMD, PhD – no periods) of your research sponsor on one line, then single space.
On the next lines, type their department, hospital and/or school. The sponsor's name and information cannot take up more than three single spaced lines. Only the principal sponsor can be listed.

4. **Bold and center the abstract title, your name, school, anticipated year of graduation, and your sponsor's information.** Do not bold the abstract text.

5. Double space between the sponsor information and the beginning of the abstract text.

6. Indent five spaces (the tab key default works well) at the beginning of each paragraph of text. Do not double space between paragraphs. **Abstracts cannot exceed 400 words.**

7. Footnotes, references, and tables **are not permitted**.

8. Your abstract will not be edited. You are responsible for correcting typographical errors prior to submission. Abstracts will be published and are widely circulated to faculty, students, donors and administrative offices.

9. Abstracts must be submitted electronically as an attachment in Word. Please do not submit PDF files as we cannot use this format when preparing the online abstract book.

HSDM DMSc STUDENTS
Sample Student Research Day Abstract

De novo Tooth Induction in the Oral Cavity

Samuel Koo, DDS, MS
Harvard School of Dental Medicine, DMSc (Periodontology) class of 2013

Richard Maas, MD, PhD
Division of Genetics, Department of Medicine
Brigham & Women's Hospital / Harvard Medical School

Tooth loss due to caries and periodontal disease affects millions of people in the United States. Titanium dental implants have been a treatment option to restore functional and esthetic demands as well as to improve patient quality of life. However, dental artificial crowns supported by titanium implants are still associated with a variety of surgical and prosthetic complications. From the clinical stand point of view, regeneration of whole tooth would be a valuable treatment option to overcome several complications and limitations of artificial rehabilitation. In connection with efforts aimed at activation of an endogenous oral stem cell niche, formation of supernumerary teeth has been accomplished through activation of the Wnt/β-catenin signaling pathway by loss-of-function of the adenomatous polyposis coli (*Apc*) gene. Similarly, upregulation of canonical Wnt signaling can be achieved in wild type (WT) animals when the Wnt protein is applied directly in animals.

We tested the hypothesis that *de novo* rodent tooth formation can be induced post-natally via local activation of Wnt signaling in the oral cavity.

To accomplish this goal we evaluated *de novo* tooth induction through the intraoral genetic activation of canonical Wnt signaling in genetically modified mice (*K14-CreER*^{TM};*Apc*$^{cko/cko}$). 4-hydroxytamoxifen (Sigma-Aldrich, St. Louis, MO) was topically applied as a single ~2μl dose (25 μg/g) in the oral cavity in post-natal day 3 (P3) *K14-CreER*^{TM}; *Apc*$^{cko/cko}$ mice to exogenously activate Wnt signaling. Our data shows that multiple supernumerary teeth formed in the labial regions of the incisors and in the coronal and distal regions of the third molars. Supernumerary teeth also formed around the first and second molars, but in fewer numbers.

In order to activate Wnt signaling in WT mice, recombinant Wnt3a was packaged in liposomes and delivered in dissected E14.5 mandibles in Trowell organ culture model. qRT-PCT showed increase of Wnt and odontogenesis related gene expressions. We conclude that *de novo* rodent tooth formation was induced post-natally via local activation of Wnt signaling in the oral cavity in genetically modified mice (*K14-CreER*^{TM};*Apc*$^{cko/cko}$).

HSDM DMSc STUDENTS
NIH-FORMATTED RESEARCH PROPOSAL
Signature Sheet

This signature sheet verifies that you have read and approved the NIH-formatted research proposal of the student named below. Please sign and date this form and return the original to the Office of Research.

STUDENT

PROGRAM DIRECTOR **DATE**

RESEARCH MENTOR **DATE**

ADDITIONAL COMMENTS

HSDM DMSc STUDENTS
NIH-FORMATTED RESEARCH PROPOSAL
Check-In Form

STUDENT

EXAMINERS **CHECK IN DATE**

EXAMINER CHECKLIST

1) The scope of the project is realistic and can be carried out by a single investigator and with some technical assistance in 3 years ☐ **YES** ☐ **NO**
2) Does the project address an important problem or a critical barrier to progress in the field? ☐ **YES** ☐ **NO**
3) Student presented a clear overview of the project. ☐ **YES** ☐ **NO**
4) Student followed the proper format for their written proposal (Specific Aims, Research Strategy, Significance, Innovation and Approach, Literature Cited. ☐ **YES** ☐ **NO**
5) Student presented a clear rationale for the hypothesis/research questions. ☐ **YES** ☐ **NO**
6) Student showed a good understanding of the strengths and weaknesses of the methods chosen. ☐ **YES** ☐ **NO**
7) Student defined expected outcomes of the study. ☐ **YES** ☐ **NO**
8) Are potential problems, alternative strategies, and benchmarks for success presented? ☐ **YES** ☐ **NO**

ADDITIONAL COMMENTS

HSDM DMSc STUDENTS
NIH-FORMATTED RESEARCH PROPOSAL EXAMINATION
Grading Sheet

STUDENT

EXAMINERS **EXAM DATE**

EXAM GRADE:

☐ **PASS** (No revisions necessary)
☐ **CONDITIONAL PASS** (See details below)
☐ **FAIL** (See details below)

The evaluators will issue a passing grade if the following recommendations are met:

Student must make the recommended changes to his or her proposal by (DATE to be decided by evaluators):

Revision Approval Method (Please check one):

☐ Revisions can be sent by student to committee via e-mail for approval.
☐ Revisions are extensive and committee must be re-convened.
☐ Other: _____

☐ FAIL (Proposal must be completely re-done. Exam must be re-taken.)

Comments regarding this decision:

APPLICATION FOR RESEARCH TRAVEL FUNDS
from the HSDM Office of Research

The HSDM Office of Research considers funding requests from students who are traveling to present research at national and regional meetings and conferences. Students may receive up to $500 per fiscal year (July 1-June 30) in research travel funding.

If you need to present a poster at a research event and your Mentor/PI does not have resources to pay for your poster printing, the HSDM Office of Research will reimburse you for the printing of your poster. We recommend using phdposters.com for printing. Please follow the guidelines on their site. You will be able to pick up your poster at 375 Longwood Ave. (If you submit your poster using your @hsdm.harvard.edu email, or any harvard.edu account, you should not be charged tax.) We are unable to reimburse any shipping fees or rush charges.

Please note that we cannot fund all requests, nor can we consider requests that are not research-related.

Please submit this completed form (either printed or by email) to Dawn DeCosta along with:

- Confirmation of acceptance to present research at conference/meeting, including title of research presentation
- Receipts or proof of payment for ***all*** reimbursement/funding requested. ***Proof of payment must be in the name of the student requesting the reimbursement.***

Student: _____

Degree program: _____

Expected year of graduation: _____

Travel dates: _____

Conference or meeting name: _____

Location and conference/meeting dates: _____

Title of research poster/presentation: _____

_____

Name of Research Mentor: _____

Have you applied, or do you plan to apply, for other HSDM funds to support this trip? If so, please specify the amount and the department/offices from which you have requested funding.

_____

_____

Total amount of funding requested: _____

Please describe what the funding will cover (poster printing, airfare, hotel, conference registration, etc.):

_____

For Student Research Mentor: I have reviewed this funding request and approve this student's application for travel funds.

_____

(Signature and date)

Mentor's name (printed): _____

If your mentor is not local, please ask him/her to email approval of this application to Dawn DeCosta (dawn_decosta@hsdm.harvard.edu).