



2021-2022 DMSc RESEARCH GUIDEBOOK

INTRODUCTION TO HSDM RESEARCH

The Office of Research supports a vibrant research program at HSDM. This includes support for basic science laboratories, clinical researchers, faculty, students, and postdoctoral fellows. The Office oversees all research-related training activities, courses and student research requirements; and administers the Biological Sciences in Dental Medicine PhD Program; the HSDM-Forsyth Research Academy DMSc Program; and the Basic and Clinical Science Seminars. The Office produces a bi-monthly Office of Research Bulletin with news about the latest advances in our labs and the accomplishments of our faculty and researchers. The Office of Research provides guidance and will support students as they fulfill their research requirements. Please do not hesitate to reach out to any member of the office, especially Dawn DeCosta.

HSDM OFFICE OF RESEARCH



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RESEARCH REQUIREMENT GRID

COMPONENTS TO BE COMPLETED BY THE END OF YEAR 4: *

- Coursework
- Identify a Research Mentor/Design Project
- Select Thesis Advisory Committee (with assistance from the Office of Research)
- Thesis Proposal Exam
- Conduct Research
- Write Thesis
- Select a Thesis Defense Committee (with assistance from the Office of Research)
- Present at Student Research Day
- Defend Thesis
- Submit Thesis Electronically

YEAR 1	YEAR 2	YEAR 3	YEAR 4
Fundamentals of Research (Fall)	Thesis Advisory Committee Approval (Fall/Spring)	Convene Thesis Advisory Committee (Fall)	Convene Thesis Advisory Committee (Fall)
Select Research Mentor (Fall)	Thesis Proposal Approval (Fall/Spring)	Conduct Research (Fall/Spring)	Finalize Thesis (Spring)
Design Project (Fall)	Oral Qualifying Exam (Spring)	Conduct Research (Fall/Spring)	Thesis Defense (Spring)
AGE Seminar Series (Spring)	AGE Seminar Series (Spring)	AGE Seminar Series (Spring)	AGE Seminar Series Present (Spring)
Student Research Day (Spring)	Student Research Day (Spring)	Student Research Day (Spring)	Student Research Day Present (Spring)

*For Research Academy Students, they will typically finish the program in 3 years. For all students, there will be some level of flexibility due to COVID19. If you are having difficulty meeting these deadlines, please discuss with your Program Director and the Office of Research.

FUNDAMENTALS OF RESEARCH COURSE

The fundamentals of research course will expose students to the basic and clinical research that is being conducted at HSDM. It will also provide the students the necessary tools for developing a testable scientific hypothesis, design and critique a scientific experiment as well as structure and write a scientific paper. The course will also teach students proper oral scientific presentation and communication. Students will be required to complete writing and group assignments, lesson quizzes, and prepare a presentation. This is a core course required for graduation. Students will fail the course if they miss any of the classes (unless approved by the Dean of Research).

FUNDAMENTALS OF RESEARCH

11 mandatory sessions from 9:00 to 12:00 pm. Location: REB 109 unless directed to a zoom link prior to class.

1. TUESDAY, SEPTEMBER 21, 2021

- Course introduction and objectives
- Philosophy of Science

2. TUESDAY SEPTEMBER 28, 2021

- Ethics – scientific conduct of research, reliable presentation of results, human and animal studies – IACUC/IRB

3. TUESDAY, OCTOBER 5, 2021

- Literature search tools and endnote overview

4. TUESDAY, OCTOBER 12, 2021

- Methods- Clinical trials
- Methods- Epidemiologic study designs

5. TUESDAY, OCTOBER 19, 2021

- Methods- Laboratory research methods

6. TUESDAY, OCTOBER 26, 2021

- Panel - Basic Science

7. TUESDAY, NOVEMBER 2, 2021

- Panel – Clinical Science

8. TUESDAY, NOVEMBER 9, 2021

- Writing an Abstract

9. TUESDAY, NOVEMBER 16, 2021

- Hypothesis Development -1

10. TUESDAY, NOVEMBER 30, 2021

- Hypothesis Development -2

11. TUESDAY, DECEMBER 7, 2021

- Articles critique discussion
- Course review and conclusion

AGE RESEARCH SEMINAR SERIES' COURSE

The AGE Research Seminar Series' Course is held in the spring semester each year. Graduating DMSc students must present their research to their colleagues and faculty. Attendance is mandatory for all AGE students regardless if you are presenting or not. Students who are presenting must submit their abstract a week in advance and will prepare a 20 - minute presentation. Course Instructors include: Drs. Jennifer Gibbs and Corneliu Sima. Dawn DeCosta is the administrative contact. Students will be evaluated on:

- Abstract quality and formatting
- Overview of the project
- Specific aims and hypothesis
- Research design and methods
- Results, discussion and conclusions
- Responses to comments and questions
- Quality of the presentation

IDENTIFY A RESEARCH MENTOR & DESIGN PROJECT

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. Your Research Advisor will guide you in all aspects of development of your thesis topic - as well as with the preparation and presentation of your thesis proposal, a prerequisite to beginning your thesis work. The most comprehensive database for Faculty mentors is on the Harvard Catalyst website: <http://connects.catalyst.harvard.edu/Profiles/SearchProfiles.aspx>. Please contact the Office of Research for a list of past mentors and projects and/or if you need assistance identifying a mentor.

OBTAIN IRB/IACUC APPROVAL

HSDM students are subject to the same policies, guidelines and regulations as the Faculty of Medicine. It is therefore necessary for student research projects to be reviewed by the Office of Research Subject Protection. The Committee on Human Studies has an Internal Review Board and reviews all human subject-related research projects. The Standing Committee on Animals has an Institutional Animal Care and Use Committee and reviews all animal subject-related research projects. It is important to note, it is HSDM's policy that students should not submit their own application, but instead, work with their Research Mentor under his/her application. Information on HMS/HSDM IRB and IACUC training, requirements, and approvals, and all relevant documents, can be found on the website of the HMS Office for Research Subject protection, <http://www.hms.harvard.edu/orsp/index.html>. Students are required to obtain all appropriate HMS/HSDM institutional and site approvals (domestic or international) before commencing research activities. If you have a question about whether your research even needs an IRB review, contact them. They can be reached at orsp@hms.harvard.edu; 617-432-3071. Dr. Shigemi Nagai, Director of Clinical Research is an excellent resource for IRB questions and troubleshooting.

ORAL QUALIFYING EXAMINATION

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, 2 of the 3 Committee members must be Associate Professors or Professors at Harvard University, or a Harvard-affiliated institution (such as the Forsyth Institute). 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 candidate's coursework and area of interest but should not be limited to the candidate's area of research. Candidates may be asked to provide an overview of their thesis project as part of the exam and should be prepared to present this information if prompted. 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. Committee members must be approved before an exam is scheduled. Once the committee has been chosen and the exam scheduled, the 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. 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. The Registrar in the Office of Dental Education generates the Committee Approval form for the OQE.

THESIS PROCESS

- Select Thesis Advisory Committee
- Thesis Proposal Examination
- Conduct Research
- Check-In Meetings with Thesis Advisory Committee
- Write Thesis
- Thesis Defense
- Thesis Submission

THESIS ADVISORY COMMITTEE

The Thesis Advisory Committee advises and counsels students on their projects. The Thesis Advisory Committee is comprised of a minimum of three full-time faculty members. 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. You may select one non-HSDM member 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 must obtain approval before any meeting is scheduled. The form for Thesis Advisory Committee may be found in the Research Guidebook. Please see Dawn DeCosta with questions and to obtain the Dean's signature.

THESIS PROPOSAL APPROVAL MEETING

At this meeting, you must present a dissertation proposal (10-15 pages submitted to the Committee 7-10 days in advance of the meeting) describing the research topic and experimental plan, for evaluation and approval by the committee. The research plan must contain sufficient detail to permit the doctoral committee to provide detailed guidance in shaping the conceptualization and methodology of the plan. The committee must unanimously approve the dissertation topic and research plan before the student move forward with the research.

WRITE THESIS

The format to be used for the thesis should be either that of a journal article or that of a formal thesis. The student should work closely with the mentor during the writing phases of the project. In either case, there are no page requirements or limitations. If you intend to use the journal article format, consult the requirements of the journal to which you intend to submit the manuscript. At your mentor's discretion the format can be either one of the following: (1) A journal article of publishable quality, or (2) A formal thesis with the following thesis guidelines:

TITLE PAGE:

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 Dental Medicine

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

Harvard School of Dental Medicine
Boston, Massachusetts

Month and Year of Submission

ABSTRACT: In 500 words or less, summarize your project.

INTRODUCTION: Significance, Hypothesis, and Background. This section should review the pertinent literature and outline the major purpose of the research. Reference should be made to previous relevant studies in order to explain what has been done as well as to explain the purpose of this research. This section should include a succinct articulation of the hypothesis tested.

INNOVATION AND APPROACH: Experimental Design, Expected Outcomes, and Interpretation. Describe clearly and carefully the procedures and materials used; a reader should be able to repeat your exact methodology. This section should also include the overall research design and statistical methods.

RESULTS AND DISCUSSION: Report the results in a well-organized fashion with minimal subjective comment or reference to the literature. This section serves mainly to introduce tables and figures and to call attention to their significant parts.

CONCLUSION AND FUTURE DIRECTION: The data should be explained and interpreted with reference to the previous literature. The significance of the results may also be included. This is the section in which to emphasize subjective comment. In a thesis, the scope of the discussion extends beyond that of a journal article. For example, you may discuss why your first experiments failed, or how you arrived at the design for a particular protocol, or what you would do next if you were continuing the study.

REFERENCES: References must be double-spaced and numbered consecutively as they are cited. References first cited in a table or figure legend should be numbered so that they will be in sequence with references cited in the text at the point where the table or figure is first mentioned.

THESIS DEFENSE

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. There may be carry over from the Thesis Advisory Committee to the Thesis Defense Committee however there must be two new readers. In addition, the student's program director and research mentor 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 Thesis Advisory Committee determines that the student has completed his/her research project, the student must generate a research thesis. Guidelines for the thesis will be provided by the Office for Research. 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. Thesis guidelines are in the DMSc Research Guidebook and samples of theses may be obtained from the Office of Research. 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

If the thesis is acceptable, 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. Once you have successfully defended your thesis, please provide the Office of Research with a copy of the signature sheet. You will then submit your thesis online at <http://etds.lib.harvard.edu>, it will automatically generate one bound copy for Countway Library's Archive Department. If you would like additional copies (i.e. your program director, yourself, your family, etc.), you must pay for this service and suggest using: <http://thesisondemand.com>.

HSDM STUDENT RESEARCH DAY

Student Research Day will be held on April 12, 2022. The primary focus of this all-day event is for graduating DMD, MMSc, DMSc, and PhD students to showcase their research to faculty as well as fellow students. All graduating DMSc students are required to present an electronic poster and must submit an abstract (500 words maximum) of their research to the Office of Research for inclusion in an abstract book. A sample may be found at the end of this Guidebook. The Office of Research awards "best poster" certificates for each student group. E-Poster guidelines and a sample will be circulated in February 2022. Faculty and Postdoctoral Fellow reviewers look at six criteria when evaluating posters:

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

ADDITIONAL RESEARCH INFORMATION & FORMS

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.

RESEARCH RESOURCES:

CORE RESEARCH FACILITIES

The Harvard Catalyst core facilities database is powered by the eagle-i network and is searchable by category, institution, or keyword <https://cores.catalyst.harvard.edu>. Please contact Jim McBride, 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.

SUBMITTING A GRANT APPLICATION

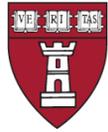
If you do plan on submitting a grant application, please work with the Office of Administration and Finance. They must be notified prior to the submission deadline. All grant applications must be approved through the Office of Administration and Finance as well as your Research Mentor prior to submission. 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 speak with Andrea Morris (andrea_morris@hsdm.harvard.edu).

POSTER PRINTING

For poster printing, the HSDM Office of Research will pay for the printing of posters on standard-industry poster paper. The HSDM Office of Research has an account at www.phdposters.com. From this link, click orange tab "Start your order now" then under the three orange tabs, you will see a link "or use a PhD Posters group account," click here and then log in HSDM; password HSDMResearch. You are responsible for picking up your poster on Longwood Avenue. The Office of Research will not pay for special material, rushed orders or shipping.

SCIENCE TALKS AT HSDM

When your schedule permits, it is highly suggested that you attend the Science Talks at HSDM. These are bi-monthly talks by invited faculty who are experts in their field of research (titles will be announced closer to the date). Science Talks at HSDM will be held from 11am to 12pm in the REB Auditorium (or via Zoom as mandated).



HARVARD School of Dental Medicine

DMSc Thesis Advisory Committee Approval

Complete all fillable fields below:

Name of Student

Project Title

Research Mentor

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. You must plan on meeting and/or checking in with your committee two times a year.

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 (*)

Committee Member 1 Name and Academic Title

Committee Member 2 Name and Academic Title

Committee Member 3 Name and Academic Title

PROGRAM DIRECTOR SIGNATURE

DATE

ASSOCIATE DEAN FOR RESEARCH SIGNATURE

DATE



HARVARD School of Dental Medicine

DMSc Thesis Proposal Summary Approval

Complete all fillable fields below:

Name of Student

Project Title

Research Mentor

Meeting Date

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 (*)

Committee Member 1 Name and Academic Title

Committee Member 2 Name and Academic Title

Committee Member 3 Name and Academic Title

APPROVE THESIS PROPOSAL

APPROVE THESIS PROPOSAL WITH THE FOLLOWING RECOMMENDATIONS

DISAPPROVE THESIS PROPOSAL FOR THE FOLLOWING REASONS



HARVARD

School of Dental Medicine

DMSc Thesis Defense Form

We, the undersigned, have read and approved the thesis of **Dr. (insert student's name)** submitted in partial fulfillment of requirements for the degree of a Doctorate of Medical Sciences at Harvard School of Dental Medicine.

Dr. (insert student's name)

(insert thesis title here)

Dr. (insert Defense Committee member's name)

Dr. (insert Defense Committee member's name)

Dr. (insert Defense Committee member's name)

Insert date

KEEP OR NOT?? TBA



HARVARD

School of Dental Medicine

Travel Reimbursement Form

The Office of Research considers funding requests from students who are traveling to present their research. Students may receive up to \$500 per fiscal year (July 1-June 30) in research travel funding towards accommodations, transportation and registration fees. Reimbursements are submitted upon return of travel. Receipts or proof of payment is required and must be in your name.

Please return completed application materials to
Dawn M. DeCosta, Office of Research, REB-404 or email
Dawn_DeCosta@hdsdm.harvard.edu

Complete all fillable fields below:

Name of Student

Program

HUID #

Research Mentor

Dates of Travel

Name of Conference or Meeting

Have you ever received a reimbursement from Harvard? YES (WHAT YEAR?) NO

Are you a U.S. Citizen? YES NO

Current Mailing Address

Permanent Mailing Address