

Harvard School of Dental Medicine

*Pre-Doctoral Research Program
Student Handbook*

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Mission of the Harvard School of Dental Medicine

The Mission of the Harvard School of Dental Medicine is to educate a very select group of students to become clinical scholars; to develop the dental sciences in the context of the total health care of the patient; to foster excellence in patient care; to generate new knowledge based upon scholarly research; and to contribute to the health of the community through the provision of clinical facilities and expertise.

The Mission reflects the close relationships that the School enjoys with the Harvard Medical School and affiliated hospitals and institutions in the Boston medical community. Founded in 1867 as the first University-based dental school, the School is known for the quality and innovation of its curriculum and for its dedication to a broad education for the most qualified students from a diverse applicant pool.

Educational programs at the School seek to assure that students have the opportunity to become clinical scholars: skilled, competent, and compassionate clinicians in general dentistry and its specialty areas; critical thinkers and problem solvers; and life-long learners. These characteristics are essential for health care professionals who will practice well into the next century in an era of rapid technological change and unimagined challenges and opportunities. The School seeks to develop in its graduates an understanding of the relationship between health care and society in general, and to promote a sense of responsibility for providing care to meet the needs of individuals. It is expected that graduates of the School will become leaders in dental practice, education, research, and administration and that they will continue to contribute substantively to their field and their community throughout their careers.

The School seeks not only to teach the latest advances in dental medicine, but also to add to the knowledge of diseases manifested orally, through the encouragement of fundamental research in the biology and pathology of the tissues of the oral cavity and maxillofacial region. The School realizes the importance of translating these basic findings into practical and cost-effective therapeutic strategies and seeks to facilitate this through the organization of its research programs and clinical departments.

The School recognizes its role as a resource to the community and is committed to helping to meet the needs of the community through the provision of high quality and cost effective health care both within the School and at local community health centers.

The School seeks to attract a diverse faculty of the most creative and talented individuals and to aid in their development as educators, clinicians, and scientists by providing them with a supportive environment and superb facilities in which to grow and be productive.

II. Overview of the Research Requirement

The components of the research requirement include:

1. coursework
2. written research proposal
3. written research report
4. formal thesis defense
5. mentor evaluation
6. presentation at HSDM Research Day

Forms and more detailed information may be found in the sections of this guide pertaining to each step in the process. Additionally, this guide is available online at <http://www.hsdm.med.harvard.edu/pages/srg/srg.html> or <http://mycourses.med.harvard.edu/default.asp>

1. Coursework – two courses are required

Principles of Research Methods – SDM103B.00
Outcomes of Treatment – SDM307C.00

2. Research

A. Selection of Mentor

B. Approval of Research Proposal

All research projects must be approved by the Director of Predoctoral Research prior to beginning any project. A written proposal must be submitted to the Office of Predoctoral Research. Details may be found in the “Research Proposal” section.

C. Sufficient Commitment of Time and Satisfactory Evaluation by Mentor

The minimum time commitment is the equivalent of 2 months full-time.

The student is required to solicit and submit the HSDM Predoctoral Research Mentor Evaluation Form by of their fourth year or any time prior to that. This form may be found in the section entitled “Evaluation by Mentor.”

D. Satisfactory Thesis Presentation and Defense

The format to be used for the thesis should be either that of a journal article or that of a formal thesis. The thesis defense committee will consist of at least 4 people: the research mentor (non-voting), a member of the HSDM Predoctoral Research Committee, and at least two others, one of whom has expertise in the area of your research. The research mentor may be from any arena (eg. academics, business, public health, etc.) however the committee members preferably will hold an appointment at an academic institution, although it is not required that this appointment be from Harvard University. Committee members may not include predoctoral or advanced graduate students. Details may be found in the section entitled “Thesis Preparation and Defense.”

E. Satisfactory Presentation of Research Results at HSDM Research Day

1. Submission of *Curriculum Vitae* and Unbound Copy of Approved Thesis to the Office of Predoctoral Research

III. HSDM Research Academy

In addition to fulfilling the HSDM Research Requirement, students are encouraged to pursue their research more extensively via the HSDM Research Academy. The goal of the Research Academy at HSDM is to encourage students with strong research interests and a demonstrated commitment to research to spend an extra year, with full funding, in a research mentor's laboratory. Students who have completed their research requirement during the summer between the first and second year at HSDM are invited to submit research reports that describe their projects and the research they would like to pursue based on their summer research experience, to the Research Academy Advisory Committee (Dr. Vicki Rosen, chair, Dr. Catherine Hayes, and Dr. David Fisher). The Advisory Committee will then select 10 students for admission to the Academy. The Advisory Committee will meet with Academy students on a periodic basis to discuss research, help with the writing of grant applications, and provide guidance for continued research activities during the second year. Based on the continued commitment to research and the exceptional research efforts during the second year, and strong letters of recommendation from research mentors, the Academy Advisory Committee will select from among the 10 Academy students up to 5 winners of a new prize, the Dean's Research Award. The Dean's Research Award winners will be invited to do full-time research for one year in between the second and third year of the DMD program. Students interested in being considered for the Research Academy should submit a summary of their research activities and interests to the Office of Predoctoral Research by October 15th of the second year of study. For more information, students may contact Dr. Rosen at the Forsyth Institute.

IV. Timelines

October	Deadline for application to the Research Academy for 2 nd year students
February	Research Mentor Evaluation Form due
March	Deadline for defense committee names and dates
Early April	Deadline for thesis defense
Late April	HSDM Student Research Day – Abstract must be submitted to Office of Predoctoral Research one month prior to Research Day
May 9	Deadline for submission of thesis and <i>curriculum vitae</i> to the Office of Predoctoral Research

*****Please note that this timeline is for those students completing their research requirement during their fourth year. If the student aims to complete the requirement prior to the fourth year, this timeline should be used as a guide for planning submissions and defenses. The above deadlines are the final deadlines.**

requirements may be completed earlier than listed with the approval of a research mentor.

V. Mentor Selection

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 requirement. 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 be feasible within the available timeframe. The mentor should have the resources to achieve the specific aims. If your project involves human subjects, you should ask whether the mentor has obtained the necessary approval. If the mentor has not obtained approval, you should budget additional time to do so. Ideally, a mentor will have demonstrated productivity by a record of publication and have a clear leadership position as evidenced by a record of private or public funding in a given area. A mentor does not have to be in the field of dentistry.

VI. Research Proposal

It is your responsibility to provide the HSDM Office of Predoctoral Research with a copy of the proposal prior to commencing any research project. The format for the proposal follows. It includes the following sections:

1. **Background and Significance** – Why is this area interesting and important, and what has been done before? Remember to include a complete literature review.
2. **Goal and Specific Aims** – What is the ultimate goal of this research? The specific aims are aptly named: they should be a *specific* outline of the research questions you would like to answer. These provide the foundation for your research. You should spend some time on developing them.
3. **Materials and Methods** – What are the specific steps by which you will achieve this goal? The information you provide should be sufficiently detailed to allow a reader to carry out your methods independently. Include the specific statistical methods, if any, that you intend to use.
4. **References**
5. **Appropriate Appendices**

The proposal should be 2-5 pages in length using 12-point font and single spacing. The procedures for submission of the research proposal vary, if the proposal is to be completed during years one or two, the proposal ultimately will be submitted to the Office of Enrichment Programs (OEP) at HMS. The deadline for this is usually early April. The student is responsible for obtaining the exact deadline for any given year directly from OEP. (Deadline April). Prior to submission to OEP, all proposals must first receive approval from the HSDM Office of Predoctoral Research.

If you are submitting a proposal to complete research in Years 3 or 4, you are not eligible for funding through the Office of Enrichment Programs. You remain responsible for submitting your proposal to the HSDM Office of Predoctoral Research prior to the commencement of any research project. Failure to meet this requirement will result in a failure in completion of the research requirement.

All proposals must be approved by the research mentor and by the HSDM Predoctoral Research Committee or the Director of Predoctoral Research. A signature is required to verify this approval.

VII. Evaluation by Mentor

It is your responsibility to solicit and submit the Mentor Evaluation Form by the to the HSDM Office of Predoctoral Research by the specified deadline. A sample form follows:



**Harvard School of Dental Medicine
Office of Dental Education**

**HSDM PREDOCTORAL RESEARCH
MENTOR EVALUATION FORM**

Please make any necessary changes to the information printed on this evaluation and answer the questions below. When complete, sign and return to the HSDM Office of Dental Education and Student Research, Room 206.

STUDENT NAME: _____

SPONSOR: _____

PROJECT TITLE: _____

SCHEDULED RESEARCH TIME PERIOD: _____

Please Evaluate student on the following areas:

1. Amount of time spent in research environment: _____
(Please give approximate hours per week)

2. Using the five point scale below, please evaluate these additional aspects of the student's performance in his/her research work:

1 - Outstanding

2 = Very Good

3 = Acceptable

4 = Marginal

5 = Unacceptable

A. Theoretical Understanding

B. Lab/Office Performance

C. Research Skills

D. Intellectual Curiosity

E. Originality

F. Organizational Ability

G. Motivation

H. Perseverance

I. Integrity

1	2	3	4	5

Do you recommend this student for Honors Consideration? _____

Additional Comments:

Sponsor Signature: _____ Date: _____

VIII. Animal or Human Subject Approval

If the research involves the use of animals or human subjects, it is the responsibility of the student to work with the mentor to obtain any necessary animal or human subject institutional approval prior to commencing a research project. Additionally, all collaborators (including students) on the project must have the appropriate research certification from their respective institutions. The research mentor should provide this information. To learn more about the use of human and animal subjects, refer to:

<http://www.hms.harvard.edu/orsp/index.html>

http://www.hms.harvard.edu/orsp/human_guidelines.html.

IX. Thesis Presentation and Defense

The thesis is presented in both written and oral formats to your thesis committee. 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. Please note that you should follow the format for the full journal article, rather than any of the abbreviated or preliminary reports. The formats for the Journal of the American Dental Association, the Journal of Dental Research, and the New England Journal of Medicine may be found at the following websites:

Journal of the American Dental Association	http://www.ada.org/prof/pubs/jada/authors/index.html
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Journal of Dental Research	http://jdr.iadrjournals.org/misc/ifora.shtml
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New England Journal of Medicine	http://www.nejm.org/hfa/subinstr.asp
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The format of the formal thesis is as follows:

At your mentor's discretion the format can be either one of the following:

- 1.) A journal article of publishable quality following the guidelines of the journal to which you and your mentor plan to submit your manuscript.

OR

- 2.) A formal thesis with the following thesis guidelines:

The thesis format is similar to that of a manuscript to be submitted to a scholarly journal. Because there are no limitations on length, however, you should plan to include all background, experimental details, and discussion points, which are pertinent to the study. As such, the thesis should be composed of the following sections.

a.) Introduction and selected review of the literature.

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. The Introduction should start or end with a succinct articulation of the hypothesis tested

b.) Materials and Methods

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.

c.) Results

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.

d.) Discussion

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.

e.) Summary and Conclusions.

Summarize essential results and conclusions. End with a statement on the real significance of the study.

f.) Abstract.

In 200 words or less, summarize the purpose, methods, results, and conclusions. A reader should be able to understand your study and its results from reading your abstract.

Thesis Defense Committee

After the student and mentor have agreed on a final draft of the written thesis, the student is responsible for contacting potential committee members. The written thesis should be provided to the committee at least one week prior to the date of the final defense. The committee should consist of at least four people:

1. A member of the HSDM Predoctoral Research Committee (Chair) (see below)
2. Two examiners who do or are familiar with research in this area (to be selected by you and your mentor)
3. Research Mentor (*Ex Officio*)

The student is responsible for taking a leadership role in identifying and coordinating a convenient time for the thesis presentation. This includes selecting a committee, identifying and coordinating the time with everyone, and reserving a meeting room.

Meeting rooms are reserved through Angela Giosi in the HSDM Office of Dental Education.

The oral presentation is no more than 10-15 minutes, and usually includes slides and/or overheads. The following discussion between the student and the committee usually lasts approximately 45 minutes. At that point the student will be excused from the room, the committee will discuss the work, and the student will then be invited back in to review the deliberations. The committee may make suggestions for alterations in the thesis, and following the revisions, provide the student with a signed thesis and evaluation.

Once a final committee and defense date have been selected, the student must notify the Registrar's Office of the date and all committee members. The student must then obtain from the Registrar the Grade Sheets for Predoctoral Thesis Evaluation and Defense Evaluation and provide them to the chair of the committee on the date of the defense. Both grading sheets must be signed by all committee members in order for final approval to be recorded. The committee may make suggestions for alterations to your thesis before providing their approval.

EXAMPLE OF A TITLE PAGE

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 Dental Medicine

*Research Sponsor: Name, Title
Institutional affiliation if other than HSDM*

Harvard School of Dental Medicine

Boston, Massachusetts

Month and Year of Submission

X. PREDOCTORAL RESEARCH DAY

Research Day provides the HSDM community with an opportunity to both share and honor our challenges and successes, and to enlighten one another.

Students are required to do an oral or a poster presentation. The student's Thesis Committee members are asked to suggest to the Predoctoral Research Committee the format for the student's presentation (oral or poster). Thus, the thesis is presented prior to the poster presentation.

The Predoctoral Research Committee then establishes the student's presentation format. Oral presentations are for 10 minutes with 5 minutes of questions. Poster presentations are presented on 4'x4' boards. Both forms of presentation follow the format of the proposal and thesis.

The Predoctoral Research Committee will evaluate the presentations.

Prior to Research Day, students will be requested to submit abstracts to the HSDM Office of Predoctoral Research. You will be asked either to present orally or via a poster.

Predoctoral Research Day Abstract Format

Abstracts must contain the following information, in order:

- 1. Abstract Title**
Capitalize appropriate words
(e.g. In situ Hybridization Studies of Osteocalcin mRNA in Developing Rat Bone)
- 2. Your Name**
(e.g. Ima Student)
- 3. School, Class Year**
(e.g. HSDM 1997)
- 4. Research Sponsor, Title, Department, School or Organization**
(e.g. Sponsored by Ima Faculty, DMD, Dept. of Oral Medicine and Diagnostic Sciences, HSDM, Brigham & Women's Hospital.)
- 5. Abstract Text (500 word maximum)**
Include:
 - Hypothesis tested
 - Brief background
 - Methods used
 - Results:
 - ◊ Data
 - ◊ Statistical analysis (where appropriate)
 - Conclusions (underline)
- 6. Funding Sources**
Name of supporting agency and grant number
(e.g. This study was supported by NIDR grant number T35 DE071000-14)

RESEARCH DAY POSTER PRESENTATION GUIDELINES

All posters presented must be approved by their respective research mentors prior to Research Day.

Poster Size

Each presenter will have a space of 4 feet x 4 feet (120x120 cm) for his or her poster. The stationary, double-sided poster boards stand 7 feet high and are 8 feet long. Thus two posters 4' x 4' will occupy each side of a poster board. A diagram and space assignment will be distributed prior to Research Day.

Poster Layout

Poster components may be mounted directly on the poster boards with pushpins. The boards are white, so it is a good idea to use a contrasting color behind each component to frame it. In designing the poster, 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, Methods, Results, and Conclusions,) and multiple graphics. It is a good idea to include the abstract at the beginning. Remember, small fonts are not "viewer friendly" while graphics are "viewer friendly." Make sure your information can be easily read from a distance of 3-4 feet away.

The banner for the poster should include **Title. Your Name (HSDM Class of _____), Sponsored by [Sponsor's Name], [Sponsor's Title and Affiliation]**. If the project was funded, cite the funding agency and grant number, if any, at the end of the abstract. Some suggestions for making the title banner are BannerMaker or Word (use Landscape orientation) in the DEC. The Forsyth Institute has facilities which may be available to students looking to produce posters according to these specifications from powerpoint presentations. Consult the Forsyth Institute (617-262-5200) for information on fees and scheduling of appointments. Copy shops like Kinko's or CopyCop have the capability of producing banners as well.

The 6 Elements of an Outstanding Poster

1. Clear title. This will indicate either the question being asked, or the answer to the question that was asked.
2. Why do it? Why is this important? Why is it interesting? Why should anyone (other than you and your mentor) care?
3. How did you do it? What are the methods?
4. What were the results?
5. Where do we go from here? Having answered an interesting and important question, how will the information be applied, or what will be the next steps toward refining the answer? (Note, if the answer to this question is to, "do a larger study" then you probably have not thought through element #2 above).
6. The entire poster should be readable in < 5 minutes. This usually means that (a) you will need to present more charts, graphs, and pictures than words; (b) the words should be readable from 4 feet away, and (c) the type font > 24.

XI. Research Resume

All graduating students need to submit a Research Resume to the Office of Student Research before April of their fourth year. In addition, any awards and honors won during the student's time at HSDM should be reported as they are earned. The following format and example should help guide the student.

Resume

Name
Address
Phone
Email

Education

Institution and Location	Degree	Year	Field of Study
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Honors/Awards

Dates	Award
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Research

Dates	Title	Location	Mentor
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Publications (in chronological order)

Research Presentations

Dates	Title of Research	Location
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XII. Honors Qualification

In order to qualify for Honors in a Special Field based upon your research, the student must spend the equivalent of four months full-time work on the research project. The research mentor and committee must recommend the student for honors. Finally, the Predoctoral Research Committee will recommend students for honors to the Promotions Committee who will ultimately decide if a student will receive Honors in a Special Field.

XIII. Funding for Travel

If a student plans to present his/her research at a national meeting, it is the responsibility of the research mentor to fund the student's travel. Students should make arrangements for travel funding prior to the submission of an abstract to a research meeting.

The Office of Dental Education has limited funds to assist students in meeting travel expenses in the case where mentors do not have funds available. These funds are only available for the AADR or IADR meetings, not to include international travel. Any request for travel funds MUST be made prior to submission of the research abstract to the scientific meeting. Requests made after the abstract has been accepted will not be considered.