College of Dentistry
The University of Iowa

THE PHD PROGRAM IN ORAL SCIENCE
Introduction

The Ph.D. degree will be awarded on completion of advanced work and original research culminating in successful defense of a dissertation. The requirements will be a minimum of 72 hours of graduate work, passing of a comprehensive examination, preparation and approval of a research prospectus, and completion and successful defense of a dissertation describing the results of the research. It is anticipated that the program will be completed in four or five years of full-time residence.

Admission Requirements

For students whose first language is not English, a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) is required. Students whose scores fall between 530 and 600 are required to sit for an English Proficiency Examination (EPE); candidates may be requested to also take the Test of Spoken English. These requirements are not absolute but will receive considerable weighting when the Admissions Committee considers applicants.

Applicants will be requested to submit a statement indicating any past research experience and present research interests and to state how the completion of the Ph.D. Program fits into their career goals. A personal interview may be requested and the candidate will be asked to submit names and addresses of teachers familiar with their predental and dental basic science training.

Course Requirements

The course work will consist of required courses in the College of Dentistry, and depending on focus, relevant courses in basic science, social science/dental public health or related departments and research.

Required courses in the College of Dentistry will include courses in research methodology, statistics and experimental design, together with courses covering aspects of the pathophysiology of oral and dental tissues, neoplasia, cariology, craniofacial biology, infectious diseases, dental public health, oral epidemiology, and health services research (listed in Appendix 1). Students will also attend Seminars in Dental Research.

Other courses which may be recommended, depending on the research direction of the student, will include graduate courses offered by such departments as Biology, Biomaterials, Microbiology, Pathology, Pharmacology, Physiology and College of Public Health and Education (see listing in Appendix 1 for examples).

Each student will be advised initially on the choice of course work by an ad hoc Graduate Committee consisting of the Program Director and two graduate faculty members with expertise in the anticipated areas of concentration.

Laboratory Rotations
Each student with a basic sciences emphasis will rotate through two or three research laboratories in the Dows Institute (or equivalent basic science laboratories where appropriate) during the first year. Students with previous experience and defined research interests may remain in a single laboratory. This experience provides students with an appreciation of problems and research approaches in various areas of oral science. Where a student is uncertain of their research, direction laboratory rotations offer a brief experience that may help them to identify a research topic and an adviser. When a student already has selected a research area, the experience provides insight into methodology in related areas.

The Major Adviser

By the second semester of their second year, students will be expected to have selected an area of research in a laboratory and to have identified an adviser.

As a result of laboratory experience and concomitant with selection of a research area, the student will select a faculty member as Major Adviser. This individual will usually be a member of the Program faculty from the College of Dentistry, but this is not mandatory and may be from outside the College. Students must seek approval of their choice of adviser from the Program Director.

The major adviser will assist the student in the selection of a Research Committee, in the matters of course work, in the scheduling and timing for the comprehensive examination, in preparation of a research prospectus and in matters relating to the conduct of research and preparation of the dissertation.

The Research Committee

The committee will consist of a minimum of five members of the graduate faculty, including the major adviser, who will serve as chairperson. At least one member must be a faculty person from outside the College of Dentistry. The members will be selected by the student and the major adviser, approved by the Program Director and appointed by the Dean of the Graduate College.

The Comprehensive Examination

The comprehensive examination is intended to evaluate the candidate's mastery of the principal field of study. The examination serves as a means of testing ability to interpret the literature, to formulate research questions and hypotheses and to present experimental approaches that answer questions and test hypotheses. It will usually be taken during the second or third year of study but no later than the end of the third year.
The Comprehensive Examination Committee

The committee will consist of at least five members of the graduate faculty including the major adviser. At least one member will be from outside the College of Dentistry and not more than four individuals may be members of the candidate's Research Committee, if this is already constituted.

The Format of the Comprehensive Examination

The examination will have two components, a written proposal and an oral examination. The proposal will take the form of a research grant application in which the candidate will address a research topic or problem in the area of, but not identical with, their contemplated dissertation research. In order to select a research topic the student will first prepare an abstract for submission to the Comprehensive Examination Committee. This should be no more than two pages in length and will propose a hypothesis or question, describe the specific aims and the research approach to the problem. The Committee will consider the significance of the proposed hypothesis or question, the relevance of the Specific Aims to approach the problem and the clarity of the abstract. If these are not found to be adequate, the student can be requested to rewrite the abstract or formulate a new one, as appropriate. There will only be one opportunity to resubmit the abstract. Once the Comprehensive Examination Committee has approved the abstract, the student may proceed with the preparation of the formal proposal for the Comprehensive Examination. At this point, the student must not seek further advice from their adviser, the Committee or other faculty, and writing must be accomplished without assistance. See the accompanying “instructions for preparing your Comprehensive Examination grant application.”

The time allowed for preparation of the proposal following approval of the topic by the Comprehensive Examination Committee will be six weeks.

Following submission of the proposal, the Comprehensive Exam Committee will conduct an oral examination in which the student's knowledge will be tested first with regard to the written proposal and then over general knowledge of the appropriate areas of oral science. Should the candidate fail to satisfy the Committee, there will be one opportunity to rewrite and re-defend the proposal.

The Prospectus

Prior to beginning research leading to the dissertation, the candidate will prepare a prospectus. This document will set out the objectives of the research and include a brief review of the literature, the questions and hypotheses involved, the methods to be used to answer these questions and for collecting, analyzing, and interpreting the data. The candidate's Research Committee will determine the exact format of the prospectus. Following Research Committee approval of the prospectus, the candidate will undertake research leading to the dissertation.
The Dissertation

The results of the candidate's research will be presented in the form of a dissertation, prepared according to the regulations of the Graduate College. The final examination will involve an oral examination open to the public and conducted by the Research Committee. The candidate will present the results of their research and will justify the objectives, methods and results of the investigation. Candidates may also be questioned on areas of knowledge that are related to, but not necessarily intrinsic to, the topic of investigation.

ADMINISTRATION OF THE PROGRAM IN ORAL SCIENCE

The Program in Oral Science will be headed by the Director who will chair the Program Committee. The Director will monitor progress of students and meet with the Research Committee and Advisor as necessary to review student progress.

Program Committee

This Committee consists of a chair, three members of the graduate faculty of the Dows Institute for Dental Research and the associated graduate faculty, the Chairperson of the Departmental Graduate Directors Committee in the College of Dentistry and one graduate faculty member from outside the College of Dentistry.

The Program Committee will have responsibilities for:

1. Reviewing the program curriculum.
2. Adding new faculty to the group of Program Faculty.
3. Admitting students to the program.
4. Arbitrating disputes between students and advisors and dealing with student or faculty grievances.

Program Faculty

The program core faculty will consist of the graduate faculty of the Dows Institute for Dental Research, together with associated graduate faculty from the College of Dentistry who have significant records of research and scholarly achievement. Graduate faculty from the College of Dentistry and elsewhere in the University may also participate on candidate’s committees.

As faculty changes, it will be necessary to add new members to the Program Faculty. This decision will be made by the Program Committee and will be based on scholarly productivity, including externally funded research grants and experience in advising students at the M.S. and Ph.D. levels.

Appendix I
Oral Science: Core Courses

151:200  **Seminars in Dental Research** ................................................................. 1 s.h.
Current state of research in a broad variety of areas in dentistry. Offered each semester.

151:210  **Dental Science Research Methodology** .................................................. 2 s.h.
Description and illustration of practical and experimental procedures in dental research; evaluation of literature and design, writing of research protocols. Offered summer semesters.

151:212  **Statistical Methods for Dental Research** ............................................. 3 s.h.
Descriptive methods, elementary probability, distributions, populations, and samples, methods for analyzing percentage data and paired and unpaired measurement data, regression, and correlation and analysis of variance.

151:215  **Research Design in Dentistry** ............................................................... 2 s.h.
Clinical research and trial design. All aspects of clinical research design and performance, from subject recruitment to study design to human subjects’ protection issues, with an emphasis on application of the principles of evidence-based dentistry. Offered spring semesters.

151:220  **Pathophysiology of Skin and Oral Mucosa** ........................................... 2 s.h.
Biology of skin and oral mucosa and changes in the behavior of the tissues in a variety of physiological and pathological conditions. Offered alternate years. Prerequisite: 151:210.

151:230  **Pathophysiology of Salivary Glands and Saliva** .................................... 2 s.h.
Innervation, structure, and function of the glands and their secretions in health and disease, and their role in the oral environment. Offered alternate years. Prerequisite: 151:210.

151:240  **Pathophysiology of Pulp-Dentin Complex** ............................................ arr.
Biology of the tissue, with emphasis on pathological changes. Offered alternate years. Prerequisite: 151:210.

151:250  **Current Concepts of Cariology** ............................................................ 2 s.h.
Etiology of dental caries, its pathogenesis and the development of preventive measures based on this knowledge. Offered alternate years. Prerequisite: 151:210.

151:260  **Bone and Tooth Support Structures and Implants** ............................... 2 s.h.
Biology of bone and periodontal structures, including effects of disease process on these tissues and the biological basis the therapeutic use of dental implants. Offered alternate years.

151:275 Oral Microbiology and Immunology ......................................................... 2 s.h.
Fundamental principles of microbiology and immunology, including dental aspects of host-parasite relations, immunological phenomena, and biological and clinical manifestations induced by major oral pathogens. Offered alternate years. Prerequisites: Microbiology, Biochemistry, Biology.

151:280 Advanced Dental Therapeutics ................................................................. 1 s.h.
Antimicrobial, analgesic, related therapies; emphasis on drug/drug interactions, treatment plan modification, case analysis of medically compromised patient. Offered fall semesters.

151:290 Strategies for Teaching Problem Solving .............................................. arr.

151:600 Research in Oral Science ................................................................. arr.
Thesis research; open only to candidates for the MS and Ph.D. degrees in Oral Science

111:202 Research Protocol Seminar ................................................................. 1 s.h.

111:204 Principles of Oral Epidemiology ............................................................. 3 s.h.
General principles of epidemiology, including retrospective, prospective and cohort study designs; validity and reliability; distribution and determinants of oral diseases - caries, periodontal disease, oral cancer, malocclusion, fluorosis, and HIV infection.

111:215 Introduction to Statistical Computing .................................................. 2 s.h.
Use of statistical packages on mainframe or personal computer for data management and analysis.

111:224 Research Design in Dentistry ................................................................. 2 s.h.
Types of studies used in dentistry, design validity; sampling methodologies; major descriptive and experimental designs used in dental research; application of statistical tests to these designs.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>60:216</td>
<td>Cell Biology I</td>
<td>3 s.h.</td>
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<tr>
<td>60:216</td>
<td>Cell Biology II</td>
<td>3 s.h.</td>
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<tr>
<td>60:272</td>
<td>Seminar in Cellular &amp; Molecular Biology</td>
<td>1 s.h.</td>
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<tr>
<td>61:147</td>
<td>Survey of Immunology</td>
<td>4 s.h.</td>
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<td>61:173</td>
<td>Laboratory Methods in Cellular Immunology</td>
<td>5 s.h.</td>
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<tr>
<td>61:218</td>
<td>Electron Microscopy Techniques</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>77:224</td>
<td>Radioisotopes in Biological Research</td>
<td>3 s.h.</td>
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<tr>
<td>82:236/84:236</td>
<td>Biomaterials Research Methodology</td>
<td>1 s.h.</td>
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<tr>
<td>99:120</td>
<td>Biochemistry and Molecular Biology I</td>
<td>4 s.h.</td>
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Appendix II

Oral Science PhD; instructions for preparing your Comprehensive Examination grant application

Font

- Use an *Arial, Helvetica, Palatino Linotype or Georgia typeface, a black font color, and a font size of 11 points or larger*. A symbol font may be used to insert Greek letters or special characters; the font size requirement still applies.

- Type density, including characters and spaces, must be no more than 15 characters per inch.

Paper Size and Page Margins

- Use standard size (8½" x 11") sheets of paper.

- Use at least one-half inch margins (top, bottom, left, and right) for all pages.

- The application must be single-sided and single-spaced.

Face Page Title of Project

Do not exceed 81 characters, including the spaces between words and punctuation.

Project Summary and Relevance 1 page

The Project Summary is meant to serve as a succinct and accurate description of the proposed work when separated from the application. State the application's broad, long-term objectives and specific aims, making reference to the health relatedness of the project. Describe concisely the research design and methods for achieving the stated goals. This section should be informative to other persons working in the same or related fields and insofar as possible understandable to a scientifically or technically literate reader. Avoid describing past accomplishments and the use of the first person.

Relevance. Using no more than two or three sentences, describe the relevance of this research to public health. In this section, be succinct and use plain language that can be understood by a general, lay audience.

Research Strategy
Specific Aims
State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.
List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Research Strategy
Organize the Research Strategy in the specified order and using the instructions provided below. Start each section with the appropriate section heading—Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section.

(a) Significance
- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

(b) Innovation
- Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or intervention(s) to be developed or used, and any advantage over existing methodologies, instrumentation or intervention(s).
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation or interventions.

(c) Approach
- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Explain how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate.
• Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.

• If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.

• Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised.

If an applicant has multiple Specific Aims, then the applicant may address Significance, Innovation and Approach for each Specific Aim individually, or may address Significance, Innovation and Approach for all of the Specific Aims collectively.

**Bibliography and References Cited**

Provide a bibliography of any references cited in the Research Plan. Each reference must include names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Follow scholarly practices in providing citations for source materials relied upon in preparing any section of the application.

The references should be limited to relevant and current literature. While there is not a page limitation, it is important to be concise and to select only those literature references pertinent to the proposed research.