Oral Biology, M.S.

KORNBERG SCHOOL OF DENTISTRY (http://dentistry.temple.edu)

About the Program
The M.S. in Oral Biology program is limited to candidates who have been accepted to a postdoctoral dental specialty program at Temple University's Kornberg School of Dentistry. Many of the application requirements for the master's in Oral Biology program can be submitted in conjunction with the PASS application for dental specialty training. Information regarding dental specialty programs at the Kornberg School of Dentistry can be obtained at http://dentistry.temple.edu/.

The M.S. in Oral Biology provides advanced education on the structure, development, and function of oral tissues, their interrelationships, and their relation to other organ systems in both health and disease. Emphasis is placed on gaining advanced understanding of oral and craniofacial structure and function in health and disease, and application of modern biological principles and research techniques in the diagnosis, treatment, and prevention of oral and craniofacial diseases and anomalies. The goals of the M.S. in Oral Biology program are to:

• advance knowledge and understanding in the scientific field of oral and craniofacial biology;
• develop "clinical scholars" in dentistry by allowing those in postdoctoral clinical specialty programs the opportunity to gain graduate-level education in a biological basic science field applicable to dentistry; and
• provide dentists with graduate-level training and experience in research methodology and technology to better qualify them for careers in academic dentistry and/or industry-related oral health activities.

Time Limit for Degree Completion: Variable, depending on affiliated specialty program

Campus Location: Health Sciences

Full-Time/Part-Time Status: Students complete the M.S. degree program in conjunction with their specialty certificate program. All specialty certificate programs are full-time.

Interdisciplinary Study: The curriculum of the Oral Biology M.S. program is interdisciplinary and crosses traditional department boundaries within Dentistry and basic biomedical sciences, such as Anatomy, Microbiology, Pharmacology, and Physiology.

Areas of Specialization: Areas of study in the Oral Biology M.S. program include traditional basic biomedical science disciplines, such as Anatomy, Microbiology, Pharmacology, and Physiology, with emphasis on how these areas relate to oral tissues and diseases. Study and research opportunities are offered in a variety of areas, including, but not limited to, Dental Biomaterials, Oral Implantology, Oral and Maxillofacial Radiology, Oral Microbiology and Immunology, Oral Molecular Biology, Oral Mucosal Disorders, Periodontal and Craniofacial Regeneration, Pulp Biology, and various clinical specialty fields.

Job Prospects: Graduates of the M.S. in Oral Biology degree program are engaged in academic teaching and research careers, private clinical patient care, and industry-related oral health activities.

Non-Matriculated Student Policy: Coursework may not be taken on a non-matriculated basis.

Financing Opportunities: Contact the Office of Graduate Education in the Kornberg School of Dentistry for information.

Admission Requirements and Deadlines

Application Deadline: Applications for the M.S. in Oral Biology are processed through Kornberg School of Dentistry's Office of Graduate Education throughout the year as they are received.

** APPLICATIONS are NOT accepted online **

Letters of Reference:
Number Required: 2

From Whom: Letters of recommendation should be obtained from dental school faculty members familiar with the applicant's academic background and potential for graduate-level study.

Degree Required for Admission Consideration: Applicants to the Oral Biology graduate program must hold a D.D.S., D.M.D., or B.D.S. degree (or equivalent) from an accredited college or university in the United States or its international equivalent. In addition, they must have been accepted to a postdoctoral dental specialty program at Temple University's Kornberg School of Dentistry.

Statement of Goals: Approximately 500-1,000 words in length, addressing:
• Academic and research achievements to date
• Overall career goals
• Specific interest in Temple University's Oral Biology graduate program
• Area and/or topic of proposed research interests

Standardized Test Scores:
TOEFL: 79 iBT or 550 PBT minimum

Resume: Current resume required.

Program Requirements

General Program Requirements:
Number of Didactic Credits Required Beyond the D.D.S. (or equivalent): 18
Additional Credits Required, including Research and Original Thesis, as described below: up to 12

Required Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ORBG 8011</td>
<td>Molecular Oral and Craniofacial Biology</td>
<td>1</td>
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<tr>
<td>ORBG 8012</td>
<td>Advanced Dental Pharmacology and Therapeutics</td>
<td>1</td>
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<tr>
<td>ORBG 8013</td>
<td>Introduction to Evidence-Based Dentistry</td>
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<td>ORBG 8014</td>
<td>Clinical Anatomy of the Head and Neck</td>
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<td>ORBG 8015</td>
<td>Research Methodology and Study Design</td>
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<tr>
<td>ORBG 8016</td>
<td>Cases in Oral and Maxillofacial Pathology</td>
<td>1</td>
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<tr>
<td>ORBG 8017</td>
<td>Oral Microbiology and Immunology</td>
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<td>ORBG 8018</td>
<td>Biostatistics</td>
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<tr>
<td>ORBG 8019</td>
<td>Advanced Oral and Maxillofacial Radiology</td>
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Additional courses specific to the interests of the student may include: 1

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ENDG 8111</td>
<td>Pain in Dentistry: Diagnosis and Control</td>
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<tr>
<td>ENDG 8112</td>
<td>Pulp Biology I</td>
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<tr>
<td>ENDG 8113</td>
<td>Periapical Biology I</td>
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<tr>
<td>ENDG 8114</td>
<td>Biologic Basis of Disease</td>
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<tr>
<td>ENDG 8116</td>
<td>Endodontic Microbiology/Immunology</td>
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<tr>
<td>ENDG 8130</td>
<td>Current Endodontics Literature Review</td>
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<tr>
<td>ENDG 8140</td>
<td>Classical Endodontics Literature Review</td>
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<tr>
<td>ORTG 8400</td>
<td>Diagnosis and Treatment Planning Conference</td>
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<tr>
<td>ORTG 8404</td>
<td>Orthodontic Biomechanics</td>
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<tr>
<td>ORTG 8407</td>
<td>History of Orthodontics</td>
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<tr>
<td>ORTG 8408</td>
<td>Craniofacial Cephalometrics</td>
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<td>ORTG 8410</td>
<td>Current Literature Review</td>
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<tr>
<td>ORTG 8414</td>
<td>Growth and Development of the Craniofacial Complex</td>
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<tr>
<td>PERG 8302</td>
<td>Biology and Pathology of the Periodontium</td>
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<tr>
<td>PERG 8306</td>
<td>Introduction to Oral Implantology</td>
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<tr>
<td>PERG 8307</td>
<td>Advanced Periodontal Microbiology and Immunology</td>
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<tr>
<td>PERG 8320</td>
<td>Current Periodontal Literature Review</td>
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<tr>
<td>PERG 8340</td>
<td>Oral Implantology Literature Review</td>
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<tr>
<td>PERG 9487</td>
<td>Oral Pathology Laboratory Rotation</td>
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Total Credit Hours 18

1 Graduate-level courses from other Temple University schools/colleges may also be taken with the approval of the Kornberg School of Dentistry's Associate Dean for Graduate Education.

Culminating Events:

Thesis:
A thesis based on original investigation must be submitted and orally defended. The thesis is intended to demonstrate the student’s ability to design and carry out original research, and to analyze, present, and interpret the resulting data under the direct supervision of an approved research preceptor. The
A thesis must address a well-focused, scientifically meaningful question and hypothesis that is of adequate scope and significance to qualify for an M.S. degree.

The date and location of a student's oral thesis defense is arranged by mutual agreement between the student and the Thesis Advisory Committee, which includes the student's research preceptor. Announcements of the thesis defense are posted at the Kornberg School of Dentistry.

The student's Thesis Advisory Committee is responsible for evaluating the thesis and its oral defense. The Thesis Advisory Committee is selected in conjunction with the approved research preceptor, who serves as the committee chair. The research preceptor must be a member of the Oral Biology graduate faculty, and approved by the Chair of the student's home academic department at the Kornberg School of Dentistry. The Thesis Advisory Committee must include at least one member (including the research preceptor) of the student's home academic department at the School of Dentistry, plus at least one outside member. The one outside member may include Temple University faculty from other departments and/or experts from outside the University. In addition, the Associate Dean for Graduate Education may serve as ex-officio member of the Thesis Advisory Committee. The majority of the members of the Thesis Advisory Committee must be members of the Oral Biology graduate faculty.

Contacts

School Web Address:

http://dentistry.temple.edu/

Department Information:

Oral Biology Graduate Program
Kornberg School of Dentistry Office of Graduate Education
3223 N. Broad Street
Philadelphia, PA 19140
sagray@temple.edu
215-707-3305
Fax: 215-707-0042

Mailing Address for Application Materials:

Oral Biology Graduate Program
Kornberg School of Dentistry Office of Graduate Education
3223 N. Broad Street (600-00)
Philadelphia, PA 19140

Department Contacts:

Admissions:
Grace Dean
grace.dean@temple.edu
215-707-3305

Associate Dean for Graduate Education:
Sarah Gray, D.D.S., M.S.
sagray@temple.edu
215-707-3305

Courses

ORBG 5001. Introduction to Dental Assisting. 2 Credit Hours.
Designed to provide the student with an introduction to the dental profession, the dental team and the roles and responsibilities of each member of the team, infection control procedures, sterilization and patient confidentiality. Students will also receive basic knowledge of dental terminology, anatomical structures of the oral cavity, and classification of occlusion. Emphasis is placed on applying information to the clinical setting.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.
ORBG 5002. Chairside Dental Assisting. 3 Credit Hours.
Designed to give the student an introduction to dental terminology, medical-dental histories, dental instruments, charting, oral evacuation, instrument transfer and procedure specific tray set-ups. Emphasis is placed on utilization of four handed dentistry skills.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 5004. Dental Radiology Lecture and Lab. 2 Credit Hours.
Designed to provide the student with basic knowledge of the principles of radiology and radiographic techniques including the principles and methods employed in the paralleling technique and radiographic interpretation. Emphasis is placed on the practice of exposing, processing, mounting, and interpreting intraoral radiographs.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 5005. Dental Anatomy. 1 Credit Hour.
Designed to provide students a basic knowledge of dental terminology, anatomical structures of the oral cavity, head and neck region, classification of occlusion and oral pathology of the head and soft tissue.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8011. Molecular Oral and Craniofacial Biology. 1 Credit Hour.
Basic concepts of physiology, biochemistry, and cell biology related to the oral cavity and craniofacial complex are explored. Topics include connective tissue biology, the role of saliva in health and disease, muscle function, taste, smell, and other sensory functions, with emphasis on current research. These seminars are designed for first-year students in postdoctoral programs in which advanced courses are combined with specialty training. The course outlines scientific information about molecular biology that contributes to our understanding of normal structures and disease processes. Wherever possible, it indicates how this information is useful or impinges on clinical dentistry. This course presupposes a broad background in the basic sciences and interrelates much recently acquired scientific information about the oral cavity that has not been attempted at the predoctoral level.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8012. Advanced Dental Pharmacology and Therapeutics. 1 Credit Hour.
Pharmacotherapeutics of drugs most often used in dentistry, with emphasis on mechanisms, interactions, and effects of drugs used in prevention, diagnosis, and treatment of oral diseases, and drugs used for systemic diseases that may influence the progression or management of oral diseases.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8013. Introduction to Evidence-Based Dentistry. 1 Credit Hour.
Contemporary topics and research presentations on oral and craniofacial biology.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8014. Clinical Anatomy of the Head and Neck. 1 Credit Hour.
Growth and development of the head and neck in relation to general gross anatomy; surgical anatomy of the head and neck region with neuroanatomic studies of cranial nerve anatomy, function and pathology; temporomandibular joint structure, function and dysfunction.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.
ORBG 8015. Research Methodology and Study Design. 1 Credit Hour.
Fundamental principles involved in planning, conducting, analyzing, and reporting of scientific research studies, including classification of study designs, hypothesis testing, clinical trial requirements, protocol and grant preparation, scientific writing, analysis and interpretation of data, and approaches to critical evaluation of the scientific literature.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8016. Cases in Oral and Maxillofacial Pathology. 1 Credit Hour.
Students are taught to formulate appropriate clinical and radiographic differential diagnoses for common soft and hard tissue abnormalities of the oral and perioral region via case based discussions. Students receive instruction in the management of patients with common oral mucosal diseases. Indications for patient referral to medical or dental specialists for diagnostic evaluation or disease management are presented. Critical thinking is emphasized in case-based modules. During the case based discussions, students will be asked to describe the lesions using appropriate terminology, offer a prioritized differential diagnosis, suggest a diagnostic plan and recommend management strategies for the entities discussed. The use of a SOAP note format for documenting problem focused patient encounters in oral and maxillofacial pathology will be applied.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8017. Oral Microbiology and Immunology. 1 Credit Hour.
Study of microorganisms and host responses important in oral microbial ecology, oral infectious processes, and the pathogenesis of dental caries, periodontal diseases, dental implant infections, endodontic infections, oral mucosal lesions, and dental focal infections at non-oral body sites.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8018. Biostatistics. 1 Credit Hour.
Introduction to statistical analysis as it applies to biomedical research, including descriptive and inferential statistics. Topics include summarizing and displaying data, theory of measurements and distribution, significance testing, and basic concepts of probability and association.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8019. Advanced Oral and Maxillofacial Radiology. 1 Credit Hour.
Applications of digital dental radiography, panoramic radiology, tomographic imaging for dental implants, computed tomography (CT), and magnetic resonance imaging (MRI); differential interpretations of clinically significant oral and maxillofacial lesions.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8021. Microbiome. 3 Credit Hours.
Course will focus on the biology, ecology, and cell behaviors in the human microbiome in the whole body with a specific emphasis on the oral cavity. Course will also cover the epigenetic changes that may occur in the microbiome and the range of health issues such as obesity, infections, and risk of developing dental and oral mucosal diseases.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8022. Microbiome Laboratory. 2 Credit Hours.
Course will follow the Introduction to the Microbiome and focus on laboratory techniques to investigate cell signaling, quorum sensing, and genomic mapping of the microbiome.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.
ORBG 8023. Craniofacial Bone Biology and Maxillofacial/Dental Orthopedic Care. 2 Credit Hours.
This introductory course will review bone biology and how bone develops and remodels in orthodontic and orthopedic care.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8024. Regeneration of Bone and Dental Hard Tissues. 1 Credit Hour.
This course will focus on dentin and bone regeneration research already being conducted at the dental school and Temple University Center for Bioengineering Research.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8025. Temporomandibular Joint Biology. 2 Credit Hours.
This course will cover the anatomy, mechanics, and function of the temporomandibular joint (TMJ) and associated muscles and ligaments. The course will also cover the dysfunctions commonly diagnosed in dental practice and how they may be manifested in the operation of the TMJ complex.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8026. Neuroscience of Pain. 2 Credit Hours.
This course will focus on the understanding of the biology of pain and how the transmission of pain signals throughout the central and peripheral nervous system. The course will also cover the mechanisms involved in determining pain thresholds and the myriad of psychological responses to pain sensations.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8027. Biology of Drug Delivery Mechanisms. 2 Credit Hours.
This course will focus on how the oral cavity and salivary glands can be used as bioreactors that may be used to deliver drugs, genes, proteins and other molecules to treat a variety of oral and systemic conditions. The course will also cover the mechanisms involved in determining pain thresholds and the myriad of psychological responses to pain sensations.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8028. Basic and Advanced Statistical Methods. 3 Credit Hours.
An introduction to statistical theory and applied methods, including modeling techniques, to analyze dental data. The course will describe the impact of clustering effects of data points in the oral cavity; correction for design effects; methods of analysis of different dental outcomes; and appropriate statistical modeling methods useful in contemporary studies.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8029. Behavioral Change Theories and Practice. 2 Credit Hours.
This course will review and apply selected behavioral change theories in addressing common behavioral problems including addiction.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

ORBG 8031. Biomaterials. 1 Credit Hour.
This course will cover the theory of bonding of materials to enamel and dentin and mechanisms used to increase the mechanical and chemical bonding of restorative materials.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.
ORBG 8032. Practical Clinical Practice. 1 to 6 Credit Hour.
Students will be assigned as dental assistants, quality evaluators, or patient advocates in the dental school clinics.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8033. Bioethics and Critical Thinking in Dentistry. 1 Credit Hour.
This course introduces dental residents to the theoretical and practical foundations of bioethics. After an introduction to the history of bioethics and its theories, tools, and strategies for identifying and resolving ethical dilemmas, students will critically explore four key components of contemporary dental ethics: 'Ethics at the Chairside' covering topics such as confidentiality, truth telling, and cultural competency; 'Oral Health Disparities' which introduces the social determinants of health into the oral health equation; 'Research and Industry' designed to teach residents to critically think about conflicts of interest and professionalism; and 'Policy Perspectives' which covers oral health and social justice and the relationships between dental practitioners, health care reform, and oral health.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8034. Advanced Practical Clinical Practice. 3 Credit Hours.
This is an advanced course where students will continue to be assigned as dental assistants, quality evaluators or patient advocates throughout the dental school clinic.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 8035. Introduction to Orthodontics. 2 Credit Hours.
The objective of the course is to introduce the post baccalaureate student to the processes of normal craniofacial growth and development in order to recognize and identify deviations from normal. The course emphasizes developmental dentistry, application to clinical orthodontics and postnatal craniofacial growth. Foundation knowledge in orthodontic diagnosis will be developed to allow systematic description of clinical orthodontic problems, orthodontic diagnosis and generation of an orthodontic patient clinical problem list.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

ORBG 9885. Pre-clinical Dental Experience for the Kuwaiti Program I. 6 Credit Hours.
This course is for selected post-graduate students enrolled in the Kuwaiti Program at Temple University Kornberg School of Dentistry. Prior to participation in assigned clinics, the resident's knowledge and skills in the disciplines of direct and indirect restorative dentistry, prosthodontics, and endodontics are assessed. Needed review or update of skills and knowledge are obtained with either assigned exercises in the pre-clinic laboratory, assigned assisting in the AEGD clinic, or with assigned literature reviews.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

ORBG 9886. Pre-clinical Dental Experience for the Kuwaiti Program II. 6 Credit Hours.
This course is for selected post-graduate students enrolled in the Kuwaiti Program at Temple University Kornberg School of Dentistry. Prior to participation in assigned clinics, the resident's knowledge and skills in the disciplines of direct and indirect restorative dentistry, prosthodontics, and endodontics are assessed. Needed review or update of skills and knowledge are obtained with either assigned exercises in the pre-clinic laboratory, assigned assisting in the AEGD clinic, or with assigned literature reviews.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

ORBG 9991. Research in Oral Biology. 1 to 6 Credit Hour.
Limited to M.S. in Oral Biology degree students with graduate program approval.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.
ORBG 9996. Master's Thesis in Oral Biology. 1 to 6 Credit Hour.
Limited to, and required of, M.S. in Oral Biology degree students with graduate program approval.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.