

# BIOLOGICAL SCIENCES (BIO-SCI) - ORAL & CRANIOFACIAL SCIENCES

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## Courses

BIO-SCI 5700 Biomaterials Teaching Credits: 2

Through this course, students will acquire teaching experience in graduate and dental student biomaterials.

BIO-SCI 5706 Growth & Development 1 Credit: 1

A course designed to teach the general principles of normal and abnormal physical, psychological and social growth and development of children and adolescents. The growth and development of the craniofacial structures is emphasized. The diagnosis of malocclusions is stressed. Consideration is given to possible approaches to their treatment.

BIO-SCI 5710 Genetics and Biochemistry of Cranial Facial Biology Credits: 2

Biochemistry of oral structures and the effect of oral diseases on these structures. This course may not be used to satisfy Cell Biology and Biophysics or Molecular Biology and Biochemistry discipline-specific requirements for the Interdisciplinary Ph.D. programs.

BIO-SCI 5739 Biomaterials for the Dental Specialist Credit: 1

Discussion of basic biomaterials principles and terminology including explanation of physical, mechanical and surface chemical properties, metallurgy, polymer chemistry, ceramics and composites. Clinical examples of how these principles apply to Prosthodontics, Endodontics and Orthodontics will be presented. Students cannot take both this course and BIO-SCI 5742 for credit.

BIO-SCI 5740 Oral Pathology Credits: 2

A study of the clinical and histopathologic features of oral diseases, including inflammatory, degenerative, metabolic, and neoplastic diseases and developmental disturbances.

BIO-SCI 5742 Biomaterials for the Restorative and General Dentist Credits: 2

A thorough discussion of basic biomaterials principles and how they apply to the practice of general and restorative dentistry. Students cannot take both this course and BIO-SCI 5739 for credit.

BIO-SCI 5743 Advanced Seminar in Dental Biomaterials Credits: 1-2

The use and behavior of dental biomaterials in Pediatric Dentistry, Prosthodontics, Orthodontics, and Restorative Dentistry will be discussed in depth. Current basic and clinical literature related to these areas will be discussed and research information to improve dental practice will be presented.

**Prerequisite:** BIO-SCI 5739 (or BIO-SCI 5742).

BIO-SCI 5747 Research Instrumentation Used in Dental Biomaterials Credits: 2-4

A discussion and laboratory use of instrumentation employed in dental biomaterials research. Practical hands-on experience will include calibration and use of specific research equipment including the Instron, metallurgical mounting and polishing equipment, measuring microscope, metallograph, and contact angle goniometer.

BIO-SCI 5750 Special Problems in Dental Biomaterials Credits: 2-4

The student will select or be assigned a special research problem including appropriate literature reviews of a special topic in dental biomaterials. Emphasis will be placed on the correlation between basic and clinical research. The design and conduct of clinical research will be discussed.

BIO-SCI 5751 Elements of the Scientific Method Credits: 1-2

For the MS, through individualized instruction with thesis committee chair, student will conduct a literature review in preparation for developing a research question leading to the thesis research proposal. For the PhD, students will select and rotate through a minimum of four laboratories in the Department of Oral Craniofacial Sciences (OCS) conducting a short research project in each. At the end of the semester, a report is required reviewing the research project and the instrumentation in each laboratory. Students are also required to attend the weekly Department of OCS Seminar Series and the monthly Professional Development Seminar Series. Research presentations cover a variety of biological, engineering and psychological disciplines relevant to oral science education and the oral health care profession. Presentations will be by faculty, students, and invited guest lecturers.

BIO-SCI 5752 Research Methods in Oral and Craniofacial Sciences Credits: 1-5

MS students will write the thesis research proposal in consultation with committee chair and members plus obtain appropriate IRB and/or IACUC approvals. For the MS degree qualifying exam, the student will write the research proposal, present the research proposal at a committee meeting, and answer related questions. Following the successful completion of the qualifying exam, the research proposal is the basis of the MS thesis project. For the PhD student, laboratory rotations will continue for a second semester as well as attendance at weekly OCS seminar series. As the student identifies a research advisor and research focus for the dissertation project, they will begin reviewing the literature.

**Prerequisites:** BIO-SCI 5751

BIO-SCI 5759 Special Problems in Pharmacology Credits: 2

Pharmacologic and therapeutic problems of special interest in the practice of dentistry.

**BIO-SCI 5760 Physiology of Oral Mineralized Tissues Credits: 2**

A study of the physiology of the oral hard tissues with emphasis on the mechanisms of the growth, remodeling, and healing of maxillomandibular bones and on the mechanism of dentinogenesis. This course may not be used to satisfy Cell Biology and Biophysics or Molecular Biology and Biochemistry discipline-specific requirements for the Interdisciplinary Ph.D. program.

**BIO-SCI 5780 Teaching Of Dentistry Credits: 1-2**

A consideration of the problems of teaching in dental schools. Each department of the School of Dentistry will report on its teaching methods. The student will observe lectures and laboratory teaching in each department.

**BIO-SCI 5790 Directed Research In Oral and Craniofacial Sciences Credits: 1-6**

Student utilizes beginning research skills to design, conduct and report an individual research project under the direction of the faculty.

**BIO-SCI 5799 Research And Thesis Credits: 1-9**

The satisfactory completion of an original research project. Results of the research and critical review of the pertinent literature are incorporated into a thesis. Credit is awarded after the student's thesis is successfully defended and accepted by the School of Graduate Studies.

**BIO-SCI 5802 Immunopathology Credits: 2**

A detailed study of selected topics in immunopathology with emphasis on physicochemical barriers such as cutaneous and mucosal immune systems.

**BIO-SCI 5805 Molecular Biology of Oral Microflora Credits: 2-3**

Lecture and discussion. The course will provide an overview of the ecology of oral microbial flora and its role in oral health and disease. Students will examine the taxonomy and ecology of normal and pathogenic oral microbial flora, acquisition of the oral microbiota and the formation of dental plaque as a biofilm. The course will also explore other aspects of microbial biology, such as; bacterial virulence factors and pathogenesis; host defense mechanisms; systemic complications of periodontal disease; antibiotics and antibiotic resistance. The second part of the course will review the effect of recent advances in molecular biology and protein biochemistry on oral diagnosis and treatment.

**BIO-SCI 5830 Structural Characterization of Dental Biomaterials Credits: 3**

A detailed study of the techniques commonly used to determine the composition and structure of dental biomaterials. Surface and near-surface characterization techniques will be emphasized. The student will be expected to complete laboratory projects on the scanning and transmission electron microscopies available in the School of Dentistry.