

## ORAL SCIENCES – REQUIRED COURSES

### **REQUIRED COURSES**

All students are to take the required courses listed in this section. Exemptions or substitutions may be granted by the Program Director only upon written request from the student based upon valid academic justification. The program director will inform the Graduate School of these substitutions.

### **ORB500: ORAL DEVELOPMENT AND PATHOBIOLOGY (2 credit hours)**

This course is a combination of lectures, student presentations and discussions, focused on current research advancements in the fields of craniofacial development, tissue engineering and oral diseases. The course will be divided into three units. Unit one will focus on fundamental principles of craniofacial and teeth development. Unit two will focus on the basics of tissue engineering and current advances in hard and soft tissue engineering. Unit three will focus on the genetic and biochemical basis of various oral diseases, as well as the connections between oral and systemic diseases. Students will meet every Monday. Introductory lectures on each topic will be given first, followed by discussion of research articles. Students (in groups) will be responsible for presenting these papers to the class, with guidance from the course instructors.

### **ORB 545 - DYNAMICS OF BONE (2 credit hours)**

This course discusses the structure and function of bone in relation to the dynamics of modeling and remodeling. The cellular and molecular mechanisms of bone formation and resorption are presented and the regulation by hormones, growth factors, cytokines as well as mechanical forces are highlighted. The pathophysiology of systemic and local bone disorders are discussed with particular emphasis on the cellular mechanisms underlying the disorders.

### **OS 502 - PHYSIOLOGY OF PAIN (1 credit hour)**

This course reviews the neuroanatomical, neurophysiological and psychological aspects of pain, particularly orofacial pain, as well as pain theories, mechanisms of nociception and transmission, and pain management.

### **OS 504/ORB 510 - SALIVA AND THE ORAL MICROBIOME (4 credit hour)**

This course is a combination of lectures, student presentations and discussions, focused on current research advancements in the fields of salivary gland biology and oral microbial ecology. The course will be divided into two units. Unit one will focus on fundamental principles of salivary gland development, function and diseases affecting the gland. Unit two will focus on microbes of the oral cavity including microbial- related diseases of the oral cavity, host responses to these diseases and the oral microbiome. Students will meet twice weekly. Introductory lectures on each topic will be given on the Monday of each week and research papers will be discussed in detail on the Wednesday of each session. Students will be responsible for presenting these papers to the class, with guidance from the course instructors.

### **OS 506 - ORAL BIOMATERIALS (1 credit hour)**

This course provides the basic chemical background for understanding processes that occur at the solid/liquid interface, especially relating to caries and implantology. Interfacial aspects of the materials and tissue surfaces will be treated from a surface chemical/analytical point of view. The

structure of biomaterials will also be discussed in terms of their mechanical and physical properties and will include biometals, bioceramics and biopolymers.

**OS 510 - RESEARCH SEMINAR IN THE ORAL SCIENCES (1 credit hr/Semester)**

This weekly seminar series encompasses a broad spectrum of research issues relevant to the Oral Sciences and, therefore, to Dentistry. It involves the presentation and assessment of current research activities of the students, faculty, and invited guests. An important objective of this course is to provide a forum for the oral presentation of research proposals, research results, and pre-thesis defenses by all students in the program. Thus, all Oral Sciences students are required to make periodic presentations. Students are also expected to develop the ability to understand the scientific principles underlying, if not all the details of, the research of others, thereby enhancing their ability to assess the scientific literature in general. This course also provides an opportunity for students to become acquainted with the faculty and with their research interests and activities. **The Research Seminar in the Oral Science must be formally taken for a minimum four (4) semesters. Only in exceptional circumstances and with the written approval of the Director, an equivalent level course can be substituted for one of the semesters.**

**OS 512 - RESEARCH DESIGN (2 credit hours)**

The course emphasis is on learning to understand research literature and to develop the ability to design and conduct worthwhile research, particularly clinical research. Issues related to scientific writing are also included. The general philosophy of this course holds that design and control issues are basic to knowledge of research and should be learned prior to dealing with issues of analysis (statistics). The following topics are included: (1) operationism -the logic of study design and the nature of controls, (2) finding a problem - the literature search, (3) simple types of designs, (4) sampling, (5) validity, reliability and generalizability; (6) manipulation and control of variables, (7) concrete issues in fitting the problem to a design and finding a design for the problem, (8) correlational study designs, (9) experimental designs, (10) ethical issues in human and animal research, (11) complex research designs, (12) special designs (e.g. the N = 1 experiment), and (13) introduction to analysis and interpretation. Each student is required to write a detailed research proposal in an area of his or her research interest. Research content used to illustrate various designs and problems are provided jointly by the instructor and students in order to maximize each student's ability to work within his or her own area of research.

**OS 518 - STATISTICAL METHODS (4 credit hours)**

The purpose of this course is to present fundamental concepts and procedures of inferential statistics. The course is intended to follow Oral Sciences 512, Research Design in the Oral Sciences. Students will develop the ability to explain the process of statistical inference, including terminology; determine appropriate statistical methods; interpret statistical results; evaluate the appropriateness of statistical procedures reported in the literature; and conduct analyses of data involving simple designs. The computer lab is intended to provide experience in using computers to solve statistical problems and practice in interpreting results of statistical analyses.

### **RESEARCH (\*\*651)**

A minimum of 8 credit hours of research credit is to be taken under the direct supervision of the student's Major Professor.

(\*\*\* = departmental code of major professor)

### **ELECTIVE COURSES**

Each student may take credit hours of elective course work, usually related to the student's area of research. Elective courses must be chosen after consultation with the student's Major Professor and Graduate Committee. For additional information, the student should consult departmental and university course listings. These must also be 500, 600, or 700 numbered courses). Typical elective courses applicable to the Master Program are listed below. These are examples and the list is not all-inclusive

Number	Title	Credit Hours
ORB-500	Hard Tissue Engineering	2
ODS-535	Advanced Oral Pathology	2
ODS-513	Bioelectrical measurements	3
OS-520	Advanced Statistical Topics	1
CDL-555	Head and Neck Anatomy	1
ODS-500	TMD Conceptual Foundations	2
ORB-522	Scientific Writing	1
ODS-514	Anatomy/Physiology of the Masticatory System	3
MIC-512	Fundamentals of Immunology	4
MIC-502	Dental Microbiology	4
PTH-600	General Pathology	5
PHT-601	Systemic Pathology	4