Department of Biomedical Sciences

The Department of Biomedical Sciences is a major locus for basic science and translational research at Texas A&M University. Baylor College of Dentistry. Departmental faculty interests range widely within a central research focus on craniofacial biology. These research interests include regulation of feeding behavior, the role of dendritic cells in cancer, the genetics of caries-causing bacteria, the genetics of tooth development, developmental biology of corneal epithelium, sutures, palate, and temporomandibular joint, mechanics of bone, and analysis of craniofacial growth in mutant and transgenic animal models. Exciting new areas of research include identifying the genes involved in the development of craniofacial structures, and tissue engineering and regeneration.

In addition to many well-outfitted individual laboratories, the Department houses a Core Laboratory for Cell and Molecular Biology and provides access to analytical tools such as confocal microscopy, laser capture, real-time PCR, and microCT.

Departmental faculty provide all basic science instruction to dental and dental hygiene students and to residents in postgraduate dental specialty programs, as well as graduate degree programs (MS, PhD) in Biomedical Sciences awarded through Texas A&M University.

Faculty

Dechow, Paul, Professor
Biomedical Sciences
PhD, University of Chicago, 1980

Honeyman, Allen, Associate Professor
Biomedical Sciences
PhD, University of Kansas, 1988

Masters

• Master of Science in Biomedical Sciences

Doctoral

• Doctor of Philosophy in Biomedical Sciences

Courses

BIMS 5126 Responsible Conduct in Biomedical Research
Credit 1. 1 Lecture Hour.
A survey of topics required for research; utilizes outside reading assignments, online modules, class presentation and discussion of cases associated with topic; offered spring semester of odd years.

BIMS 5127 Microscopy
Credits 2. 2 Lecture Hours.
Principles and methods of scanning electron microscopy. Technical instruction includes tissue preparation and equipment maintenance. Includes the usage of scanning electron, light, fluorescent and confocal microscopes and computer imaging techniques. Offered spring semester.

BIMS 5128 Nanobiomaterials and Regenerative Medicine
Credit 1. 1 Lecture Hour.
This course will bring state-of-the-art knowledge of nanobiomaterials and regenerative medicine to students. Topics includes nanobiomaterials design, syntheses and preparation, nanobiotechnology for scaffold fabrication, surface functionality of nanobiomaterials, nanobiomaterials for drug and gene delivery, stem cell and nanobiomaterials, and the applications of nanobiomaterials for various tissue regeneration (bone, cartilage, tooth, et. al.).

BIMS 5190 Seminar: Current Issues in Science
Credit 1. 1 Other Hour.
Guest lectures, workshop lectures and discussion includes topics of current interest to program faculty and students and of general interest in the biomedical sciences. Offered fall and spring semesters.

BIMS 5205 Oral Histology
Credits 3. 3 Lecture Hours.
Origin and development of the dental tissues and their related structures. Current publications and research reports are used to provide students with an opportunity to investigate some phase of active interest to them and their anticipated future interest in practice. Offered spring semester.

BIMS 5208 Microbiology
Credits 3. 3 Lecture Hours.
Introduction to basic microbiology with emphasis on oral and medical microbes, taxonomy and microbial physiology. Taught in conjunction with dental curriculum. Additional readings and discussion for graduate student. Offered fall and spring semesters.

BIMS 5214 Clinical Pharmacology
Credit 1.5. 1.5 Other Hour.
Selection and evaluation of dentally-related drugs and review of current literature; seminar format. Limited to clinical specialty students. Offered fall semester.

BIMS 5221 Research Design and Methodology
Credits 2. 2 Lecture Hours.
An introduction to the research process; sufficient background in research design and methodology is provided to enable students to critically evaluate literature and assist in the formulation of research projects. Also includes discussion of rules and regulations for human and animal research. Offered fall semester.

BIMS 5222 Applied Biostatistics
Credits 2. 2 Lecture Hours.
Overview of applied biostatistics with an emphasis on oral health research. Training includes computer-based instruction in data analysis using SPSS. Offered spring semester.

BIMS 5224 Teaching Practicum in Applied Biostatistics
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
This practicum is designed to engage the advanced student in all aspects of teaching applied biostatistics. Objective (1) of the practicum is to learn how to present biostatistics such that health professions graduate students can master it. Such mastery includes applying statistical concepts and methods to one's own research and to that published in the professional literature. Objective (2) is to learn about the creation and evaluation of fair assessments of student performance (tests, projects, etc. and grading them). Not available for distance learning.
BIMS 5244 Advanced Biology of Mineralized Tissues
Credits 2. 2 Lecture Hours.
Overview of the advanced biology of mineralized tissues and their roles in oral health and disease. The course will cover the basic molecular biology of teeth and the skeleton, including bone and cartilage and other aspects of systemic biology. Offered fall semester.

BIMS 5251 Immunology
Credits 1 to 2. 1 to 2 Lecture Hours.
Update on the principles of immunology with an emphasis on oral aspects and related diseases. Offered fall semester.

BIMS 5263 Sensory Neurobiology and Pain
Credit 1. 1 Lecture Hour.
An overview of the various sensory systems is explored with the primary emphasis on the processing of pain and temperature information from the craniofacial complex. Offered summer semester of odd years.

BIMS 5280 Introduction to Evidence-Based Dentistry and Clinical Research
Credits 3. 3 Lecture Hours.
This is a year-long course for graduate students consisting of lecture sessions, and small group discussions and seminars. A progress grade will be given at the end of the first semester followed by a final grade of record at the end of the year. The main goal of the EBD curriculum at Texas A&M Baylor College of Dentistry is to provide dental scientists and dentists-in-training with the knowledge and tools to take advantage of constantly increasing knowledge in clinical, material, and basic biomedical sciences. Taught in conjunction with dental curriculum. Additional readings and discussion for graduate students. Not available for distance learning.

BIMS 5301 Neuroscience
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Lectures and laboratory sessions on gross and microscopic anatomy of the human central and peripheral nervous system. Neurophysiology of the central nervous system, peripheral nerves, special sense, autonomies and clinical mediation. Offered spring semester.

BIMS 5307 Cellular and Molecular Biology
Credits 2 to 3. 2 to 3 Lecture Hours.
Prerequisite: none. Intermediary metabolism of protein, protein synthesis, nucleic acid metabolism and biochemical endocrinology. Offered fall semester.

BIMS 5312 Applied Medical Physiology
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Basic physiology of the cardiovascular, respiratory and renal systems. Each area is expanded to include physiology problems seen clinically as they relate to the dental intern. Offered summer semester.

BIMS 5324 Advanced Biostatistics
Credits 2. 2 Lecture Hours.
Advanced biostatistical methods, including multivariate and longitudinal analysis; computer simulations; applications in craniofacial biology.

Prerequisites: BIMS 5222 or equivalent.

BIMS 5341 Techniques in Cell and Molecular Biology
Credit 1. 1 Lecture Hour.
Principal methods of cellular/molecular investigation of proteins and nucleic acids including immunochemistry, western blotting, northern/southern blotting, radioimmunoassay, in situ hybridization, polymerase chain reaction, intracellular recording and fluorescence confococal microscopy. Offered summer semester.

Prerequisite: BIMS 5V40 or equivalent.

BIMS 5350 Oral Microbiology
Credits 2 to 3. 2 to 3 Lecture Hours.
The environment of the mouth is described and its relation to the endogenous and exogenous oral microbiota; relationship between disease and bacterial species; discussion of species differences; molecular mechanisms of bacterial pathogenesis; and host response to oral microbes. Offered spring semester.

Prerequisites: BIMS 5208 or equivalent.

BIMS 5360 Advanced Neuroscience
Credit 1. 1 Lecture Hour.
Advanced concepts of neuroscience are presented with an in-depth coverage of membrane and system function.

Prerequisite: BIMS 5301 or equivalent.

BIMS 5376 Evolutionary and Functional Morphology
Credit 1. 1 Lecture Hour.
Comparative anatomy and evolution of craniofacial structure, with emphasis on current techniques of electrophysiology, kinesiology, and musculoskeletal biomechanics of orofacial function. Offered fall semester.

BIMS 5402 General Histology
Credits 3. 3 Lab Hours.
General histology and microscopic anatomy of the four basic tissues. Laboratory study of electron micrographs and prepared slides is employed. Offered fall semester.

BIMS 5503 Gross Anatomy
Credits 4. 4 Lab Hours.
Conceptual and functional basis for understanding macroscopic structure of the human body utilizing laboratory dissection of human cadavers. Regional anatomy of the back, thorax, upper limb and head is emphasized. Offered fall semester.

BIMS 5611 Mammalian Physiology
Credits 4 to 5. 4 to 5 Lab Hours.
Basic physiology principles of cells, muscle, nerve, blood, heart, circulation, respiration, digestion, excretion and central nervous system in maintaining homeostasis. Classical laboratory experiments are used to demonstrate these principles. Offered spring semester.

BIMS 5V04 Head and Neck Anatomy
Credits 1 to 1.5. 1 to 1.5 Lab Hours.
Special emphasis on surgical anatomy and distribution of nerves and vasculature of particular interest in the field of dentistry. Offered summer semester.

BIMS 5V40 Cellular and Molecular Biology or Oral Craniofacial Tissues
Credits 1 to 10. 1 to 10 Lecture Hours.
A general survey intended to provide background information concerning the methods and theory of modern cellular/molecular biology. This lays the groundwork for more advanced study, aids those interested in incorporating cellular/molecular approaches into their research work and enables one to read, understand and evaluate current scientific literature. Offered spring semester.

Prerequisites: BIMS 5307 or equivalent.

BIMS 5V42 Cellular and Molecular Biology or Oral Craniofacial Tissues II
Credits 1 to 10. 1 to 10 Lecture Hours.
Processes of epithelial-mesenchymal interaction as related to odontogenesis; amelogenesis; dentinogenesis; collagen formation, intracellular and extracellular calcium homeostasis; plaque and calculus; and wound healing. Offered spring semester.
**BIMS 5V69 Growth and Mechanisms of Development**  
Credits 0 to 2. 0 to 2 Lecture Hours.  
Normal prenatal growth and development. Patterns and mechanisms of growth and maturation. Offered fall semester.

**BIMS 5V73 Advanced Craniofacial Development and Craniofacial Anomalies**  
Credits 1 to 10. 1 to 10 Lecture Hours.  
Detailed investigation of the basic processes and mechanisms of postnatal growth and adaptation of the craniofacial region. This course emphasizes the areas of controversy surrounding current understanding of the factors influencing postnatal craniofacial growth and form; the adaptive capabilities of growth and form; the adaptive capabilities of craniofacial tissues; the effect of altered function on craniofacial growth and form; and the influence of treatment on craniofacial growth and form. Also considered are theories of craniofacial growth. Offered fall semester.

**BIMS 5V75 Physical Growth and Maturation**  
Credits 0.50 to 2. 0.50 to 2 Lecture Hours.  
Pattern and mechanisms of postnatal growth and maturation. Offered spring semester.

**BIMS 5V78 Teaching Practicum in Gross Anatomy**  
Credits 3. 3 Lab Hours.  
Assist with laboratory dissection of human cadavers. Lead class study groups and prepare pro-sections for the D1 class. Regional anatomy of the back, thorax, upper limb and head is emphasized. Taught in conjunction with dental curriculum. Additional readings and exercises are designed to instruct graduate students in how to teach the subject.

**BIMS 5V81 Seminar: Current Issues in Bone and Mineralized Tissue Biology**  
Credit 1. 1 Other Hour.  
Topics of current importance in bone and mineralized tissue biology. Offered fall and spring semesters.

**BIMS 5V91 Special Topics in Biomedical Sciences**  
Credits 0 to 10. 0 to 10 Other Hours.  
Reading and discussion of current literature pertinent to topic of seminar. Presentation of papers on selected topics is required for all students. May be used for multiple courses in any one semester. Offered fall, spring and summer semesters.

**BIMS 5V92 Special Topics in Biomedical Sciences**  
Credits 0 to 10. 0 to 10 Other Hours.  
Reading and discussion of current literature pertinent to topic of seminar. Presentation of papers on selected topics is required for all students. May be used for multiple courses in any one semester. Offered fall, spring and summer semesters.

**BIMS 5V93 Directed Readings**  
Credits 0 to 10. 0 to 10 Other Hours.  
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.

**BIMS 5V94 Directed Readings**  
Credits 0 to 10. 0 to 10 Other Hours.  
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.

**BIMS 5V95 Directed Readings**  
Credits 0 to 10. 0 to 10 Other Hours.  
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.

**BIMS 5V96 Research and Special Problems**  
Credits 0 to 10. 0 to 10 Other Hours.  
Concentrated investigation in any area of biomedical sciences. This course may be used for individualized laboratory rotations or research.

**BIMS 5V97 Research and Special Problems**  
Credits 0 to 10. 0 to 10 Other Hours.  
Concentrated investigation in any area of biomedical sciences. This course may be used for individualized laboratory rotations or research.

**BIMS 5V98 Thesis Research and Preparation of Master’s Thesis**  
Credits 0 to 10. 0 to 10 Other Hours.  
Original research on a problem related to oral biology as partial fulfillment of the degree requirements; search literature, establish a research problem, prepare a research proposal, have it approved by thesis committee, conduct necessary experimental and control procedures to test the established hypothesis, analyze the data and write thesis.

**BIMS 5V99 Dissertation**  
Credits 0 to 10. 0 to 10 Other Hours.  
Course used by students after achieving candidacy for research and preparation of Ph.D. dissertation.