

ORTHODONTICS & DENTOFACIAL ORTHOPEDICS CERTIFICATE

Overview

The mission of the Orthodontics and Dentofacial Orthopedics Certificate Program in the School of Dentistry, at The University of Texas Health Science Center at San Antonio is to educate specialists in orthodontics to prevent and correct dental malocclusions and dentofacial deformities at both the population and the individual level, thus contributing to the improvement of oral health of the population of South Texas.

This mission will be accomplished by educating clinical orthodontic specialists competent and proficient in providing services in evidence-based clinical practice and to participate in education of future orthodontists.

The mission of the Orthodontics and Dentofacial Orthopedics Certificate Program will be fulfilled by achieving the following goals over the 35 months of the program:

1. Graduated and certified orthodontic specialists will demonstrate competency in clinical orthodontics and professional and ethical behavior in clinical practice.
2. The graduates will be prepared and qualified for certification by the American Board of Orthodontists (ABO).
3. The graduates will demonstrate a thorough knowledge base of etiology of dental malocclusions, dentofacial deformity, growth and development and management of malocclusions according to accepted standards of care in orthodontics.
4. The graduates will demonstrate a knowledge in and understanding of research by completing a research project that includes protocol development, data collection and analysis, preparation of a publishable quality scientific paper and presentation of findings at a scientific forum.

Admissions Requirements

1. Graduation from a Dental School with a D.D.S., D.M.D., or non-U.S. equivalent prior to matriculation.
2. Completed online PASS application for admission to the Graduate Orthodontics and Dentofacial Orthopedics Program.
3. Please email the department (<http://www.uthscsa.edu/academics/dental/orthodontics-and-dentofacial-orthopedics-certificate-admissions-details/>):
 - a. A 2x2 inch photo
 - b. A copy of Graduate Record Exam (GRE) scores
 - c. A copy of the Test of English as a Second Language (TOEFL) results if an international student and English is a second language
 - d. A copy of the National Boards Part I results.
4. Application deadline (<https://www.uthscsa.edu/academics/dental/programs/orthodontics-and-dentofacial-orthopedics/>) can be found on the program's website.

Degree Requirements

Certificates will be awarded upon the student's successful completion of the prescribed curriculum with a 3.0 minimum grade point average, recommendation of the program director to the Associate Dean for Student Affairs and certification by the dean to the president.

The M.S. in Dental Science degree will be awarded to students who successfully complete the certificate and the required courses (<http://catalog.uthscsa.edu/biomedicalsciences/dentalscience/orthodontics/>) in the Graduate School.

Sample Plan of Study

First Year

Fall		Credit Hours
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5030	Case Analysis Seminars 1	1
ORTH 5035	Current Literature Review 1	1
ORTH 5015	Orthodontic Biomechanics	1
ORTH 5010	Introduction to Orthodontics ¹	0.5
ORTH 5013	Orthodontic Treatment Planning ¹	0.5
INTD 5013	Perio/Pros/Endo/Orth Interdisciplinary Course ¹	1
MSDS 5090	Grad Research Methodology ¹	2
MSDS 5121	Biostatistics ¹	1
MSDS 5020	Dental Biomed Core 1 ¹	4
PATH 5035	Oral Pathology ¹	2
Spring		
ORTH 5030	Case Analysis Seminars 1	1
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5037	Orthodontic Lecture Series 1	1
ORTH 5012	Orthodontic Lab Technique	0.5
ORTH 5090	Research 1	0.5
INTD 5013	Perio/Pros/Endo/Orth Interdisciplinary Course ¹	1
MSDS 5021	Dental Biomed Core 2 ¹	1
Total Credit Hours:		21.0

Second Year

Fall		Credit Hours
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5035	Current Literature Review 1	1
ORTH 5030	Case Analysis Seminars 1	1
INTD 6019	Pharmacotherapeutics	1
INTD 6014	Perio/Pros/Endo/Orth Interdisciplinary Course ²	1
ORTH 5037	Orthodontic Lecture Series 1	1
Spring		
ORTH 5030	Case Analysis Seminars 1	1
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5035	Current Literature Review 1	1
ORTH 5037	Orthodontic Lecture Series 1	1
ORTH 5028	ABO Literature Review	1

INTD 6014	Perio/Pros/Endo/Orth Interdisciplinary Course 2 ¹	1
Total Credit Hours:		12.0
Third Year		
Fall		
		Credit Hours
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5011	Orthodontic Techniques	1
ORTH 5030	Case Analysis Seminars 1	1
ORTH 5035	Current Literature Review 1	1
ORTH 5037	Orthodontic Lecture Series 1	1
ORTH 5014	Literature Seminars	0.5
ORTH 5070	Practice Management	0.5
INTD 6115	Perio/Pros/Endo/Ortho Interdisciplinary Course 3 ¹	1
Spring		
ORTH 5030	Case Analysis Seminars 1	1
ORTH 5020	Clinical Orthodontics 1	1
ORTH 5037	Orthodontic Lecture Series 1	1
ORTH 5035	Current Literature Review 1	1
INTD 6115	Perio/Pros/Endo/Ortho Interdisciplinary Course 3 ¹	1
Total Credit Hours:		12.0

¹ This course is shared with the certificate and the M.S. Dental Science.

Objectives/Program Outcomes

The Orthodontics & Dentofacial Orthopedics Certificate Program at the health science center School of Dentistry is designed to prepare students to acquire the knowledge and clinical skills necessary to provide comprehensive orthodontic care and correct malocclusions and limited skeletal deformities in children and adults, including those with special health care needs.

Program Outcomes: At the completion of the program the student will:

1. Demonstrate competency and proficiency as a clinical orthodontic specialist in evidence-based clinical practice.
2. Demonstrate the understanding of and competency in professional and ethical behavior in clinical practice.
3. Demonstrate a thorough knowledge base of etiology of dental malocclusions, dentofacial deformity, growth and development and management of malocclusions according to accepted standards of care in orthodontics.
4. Complete a research project that includes protocol development, data collection and analysis, preparation of a publishable quality scientific paper and presentation of findings at a scientific meeting.

Courses

INTD 1091. Independent Study. 4 Credit Hours.

Students will work directly with a faculty advisor or assistant dean to develop an independent plan of study.

INTD 3001. International Elective. 0 Credit Hours.

Students will work with the course director and Assistant Director of Global Health to identify an appropriate international elective site, using established sites/programs or one that the student discovers on their own. All rotations must be vetted and approved by the course director and will adhere to a community service-learning model that is a structured educational experience combining community service with preparation and reflection. Students are expected to help shape the learning experience around community-identified needs and advance insight related to the context in which service is provided, the connection between service and academic coursework, and students' roles as citizens and professionals. Students will spend 4 weeks living and working at an international service site. Sites may allow for a range of experiences, such as participating in patient care, conducting clinical or public health research, and/or participating in a language immersion program. There may also be opportunities for patient education and emphasis on efforts of local empowerment, aiming to build up the communities in a sustainable way. Regardless of the focus, all sites must be supervised by qualified health care providers. Students are encouraged to integrate themselves into the health care delivery system, to explore community needs that they could address, and when possible, to strive to make an impact through community education, home visits, and research. Reflection essays serve as a way to process experiences, including clinical cases, new perspectives gained, and analysis of health care disparities, and strategies for the overcoming poverty-related health problems. Students are encouraged to share their experiences upon return through a formal presentation.

INTD 3002. School of Medicine Research Elective. 0 Credit Hours.

Students will participate in basic or clinical research projects under the supervision of university faculty. The goal of this elective is to immerse students in a rich research environment and provide an opportunity to work with research mentors to fully engage in the research process from writing the proposal to collecting the data to disseminating research results. This elective is open to students who already have an established working relationship with a faculty member and who wish time to continue their work, students who wish to establish a new project, and for students who are in the MD-MPH degree program and MD with Distinction in Research Program. Interested students must contact the course director prior to the enrollment date to express interest in the elective and receive further instructions on the application process for the research and identification/ confirmation of the faculty mentor.

INTD 3030. Clinical Foundations. 3 Credit Hours.

The purposes of this completely online course are to: 1. Prepare early clinical students to increase knowledge in clinical settings including: a. Exposure to healthcare team members, b. Exposure to roles on clerkship (H&Ps, orders, SOAP notes, prescriptions, etc.), c. Interpretation of EKGs and radiographs, d. Interpretation of normal/abnormal lab values, e. Recognition of fatigue/strategies to combat fatigue in clinical settings, f. Basic understanding of ventilator management/ICU care, g. Patient insurance issues/patient health care financial resources, h. Avoidance of medical legal problems, i. Better success on exams, j. Performance of evidence-based searches in medical literature, k. Understanding fundamentals of translational research; 2. Assist students in developing new skills expected of early clinical students including: a. Intravenous catheter placement, nasogastric catheter placement, urinary catheter placement, and O2 management, b. Sterile gloving and sterile technique, c. Basic suturing/staple placement and removal; and 3. Prepare early clinical students for their roles in clinical settings including: a. Patient care under supervision, b. Patient privacy-HIPAA, c. Professionalism and responsibility to team and patients, d. Patient safety, e. Proper use of social media in patient care, f. Strategies to be best student on the first clerkship, g. OSHA and hand hygiene, h. Proper professional attire, i. Completion of evaluations on residents and faculty. The students will complete credentials for major clinical sites.

INTD 3058. Hospice and Palliative Medicine. 0 Credit Hours.

This rotation offers clinical experience in Hospice and Palliative Medicine (HPM). Palliative care provides treatment for seriously ill hospitalized and ambulatory patients and focuses on symptom management, enhancement of function, physical comfort, quality of life, psychosocial support, and communication about the goals of medical care for the patients as well as their families.

INTD 3091. Independent Study. 9 Credit Hours.

Students will work directly with a faculty advisor or assistant dean to develop an independent plan of study.

INTD 4007. Interprofessional Community Service Learning. 2 Credit Hours.

This is an innovative interdisciplinary service learning (CSL) course offered in partnership with the UT School of Pharmacy, PHR 270S, to allow medical students to integrate meaningful community service with instruction, preparation, and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities. This course will provide the opportunity for students to examine social justice and social determinant of health issues and apply these principles in a structured serviced learning practicum. The student-led service learning project will address the social and health needs of a community partner and will be conducted with the partner agency in a culturally competent manner. Through online learning modules, readings, and discussion; monthly class sessions; a group service learning project; and a structured service learning practicum, this course combines community service with preparation and reflection to foster civic responsibility in the health professions. Open for Cross Enrollment on Space Available Basis.

INTD 4008. Interprofessional Care in HIV. 0.5 Credit Hours.

Students will have the opportunity to learn how to function as a member of an interprofessional team in HIV case management. The objective is for students to become familiar with issues of patient safety, health literacy, medication reconciliation, and interprofessional teamwork in HIV care. This is an elective didactic course.

INTD 4009. Interprofessional Care in HIV. 2 Credit Hours.

Students will have the opportunity to learn how to function as a member of an interprofessional team in HIV case management, and become familiar with issues of: patient safety, health literacy, medication reconciliation, treatment guidelines, and interprofessional teamwork in HIV care.

INTD 4011. Capstone I: Machine Learning and Artificial Intelligence for Health and Medicine. 4 Credit Hours.

This course is intended as a stand-alone demonstration of AI principles for completion of the MS in AI dual degree program. Project topics include applied machine learning, neural networks, or natural language processing in health and medicine. The course aims to give students the minimal requisite skills to carry out an independent research project in ML and AI, train students to write up their findings and ideas accurately, and clearly and coherently present their own findings. Each student must have a mentor with a primary appointment in UTHSCSA, and an additional mentor with a primary appointment in UTSA (and adjunct appointment in Medical Education at UTHSCSA). Project topics and data may be given by assigned mentors which include but not limited to Patient Risk Identification, Imaging Classification (either digital pathology, or radiology), Clinical Trials Research, Basic research in the health sciences with parametric and non-parametric data. Prerequisites include: completion of the one-year didactic coursework through UTSA is required for the MS in AI program, students must have at least an introductory level of data science understanding with preparation for a standard data science workflow, knowledge of basic R/Python/MATLAB programming, and select mentors from UTHSCSA and UTSA.

INTD 4012. Capstone II: Machine Learning and Artificial Intelligence for Health and Medicine. 4 Credit Hours.

The primary learning objective of this elective is to prepare students for the advanced use of machine learning (ML) and artificial intelligence (AI) techniques in the professional health field. Successful completion of this course will provide students with knowledge of applications of ML and AI to health and medicine with quarter long project approved by the instructor and mentor. This course is a requirement for students enrolling in the MD/MS in AI dual degree program but is available to all medical students in good standing at the LSOM. If time allows, topics on more advanced theories of machine learning and artificial intelligence will be introduced. This course is a continuation of Capstone I. The course is intended to take the experience students gained in Capstone I and apply to an original/novel research idea in the data science domain. The course aims to give students the skills to conduct original research with a mentor, write up their findings in preparation for publication to a journal, and ultimately submit them for publication. Completion of Capstone II qualifies the student for an MS in AI with a thesis. Original/Novel research ideas may be given to students by their mentors, or they may choose a topic of their which will then be approved by both the mentors. The students must first complete Capstone I, and must have the same mentors as Capstone I and II unless a request is made and approved. Prerequisites for this course include completion of the one-year didactic coursework through UTSA is required for the MS in AI program. Students must also have at least an introductory level of data science understanding with preparation for a standard data science workflow, knowledge of basic R/Python/MATLAB programming, and select mentors from UTHSCSA and UTSA. Completion of INTD 4011: Capstone I; Machine Learning and Artificial Intelligence for Health and Medicine.

INTD 4015. Humanism in Medicine Fellowship. 2 Credit Hours.

This is a longitudinal 4th-year elective to support and nourish the inherent altruism of our students. This elective will bring together like-minded students and faculty who have a passion for caring for the medically underserved in their communities. The students will take a leadership role in managing and directing the student-run clinics at the Alpha Home, SAMM Transitional Living and Learning Center, Haven for Hope, Travis Park Dermatology (under faculty supervision). Clinical experiences will be at these clinics. This elective will include a few evening seminars throughout the year in which students and faculty meet to discuss social justice, how to start a free clinic, homelessness and topics chosen by the students. Every student will complete a project of their choice over the year.

INTD 4018. Independent Elective in Ethics. 2 Credit Hours.

In this longitudinal course, students will be required to undertake an independent study into a specific issue in medical ethics or medical humanities. Students will be required to read on research methods in medical ethics as well as literature in their issue of interest, and then to propose and conduct an original study project, a literature review, a position paper, or an ethical analysis of a particular topic or case. Students will be expected to write an academically rigorous final research report of 10 to 15 pages. Students will be encouraged to produce a final paper that can be submitted for publication in a peer-reviewed bioethics or medical humanities journal. Students will be required to meet with the instructor and/or chosen faculty advisor over the course for assistance, guidance, and discussion. (Center for Medical Humanities and Ethics).

INTD 4019. Clinical Ethics. 2 Credit Hours.

Students in this two-week course will have the opportunity to focus on work in clinical ethics consultation. The student will be required to participate in rounds as an ethicist, do in-depth reading on clinical ethics consultation, observe clinical ethics consults, attend ethics committee meetings, and provide an educational seminar to hospital staff on an issue of ethical significance.

INTD 4025. Healthcare Practice and Policy Elective. 0.5 Credit Hours.

The Healthcare Practice Elective is an introductory-level, discussion-based, eight-hour course targeted to fourth-year medical students. The course focuses generally on practice and policy issues of payment methodologies, cost-effectiveness, and access to care.

INTD 4030. Serving Marginalized Communities: From local to global. 2 Credit Hours.

This is a 2-week, in person course for 4th-year medical students who are planning future work in marginalized communities either locally or globally. This preparatory course uses a multidisciplinary, asset-based approach to provide a foundation of practical knowledge in community engagement to optimize the students' experiences, facilitate their adaptation to working in diverse settings, and maximize their impact in the communities where they serve. Topics include community partnerships and responsiveness to community needs, chronic and infectious illnesses of high burden in marginalized communities, prioritizing community resources, advocacy, health equity, ethical dilemmas, cultural humility, and professionalism. Course material is presented through a variety of approaches, including lectures, small-group case discussions, laboratory sessions, and online learning modules.

INTD 4035. COVID-19 The Pathogenesis of a Pandemic. 2 Credit Hours.

Students will be introduced to the novel coronavirus SARS-CoV-2 and the disease it causes, COVID-19. They will review emerging information pertaining to the virus and disease including virology, epidemiology and pathophysiology. They will also be engaged with material covering leadership principles, communication and social determinants of health. They will participate in online activities and discussions to further facilitate learning. This elective is completely online. Prerequisites: Completed MS1 and MS2 curriculum.

INTD 4045. Patient Notes- Enrichment Elective. 0 Credit Hours.

It is an interactive, inter-professional course that engages students in music listening sessions to teach students active listening skills. Through various forms of music, students will learn how to actively listen for specific details to gain insight on meaning, become comfortable with ambiguity and interpretation, and develop pattern recognition skills to quickly recognize deviation. Students will also develop stronger methodology for writing patients notes through conceptual practice of SOAP format notes for music pieces. Taught jointly by UTHSCSA faculty and professional musicians, this strategy of applying practical skills to an abstract concept such as music will refine these skills for students in clinical settings. Specifically, this course aims to improve interpersonal communication skills, and organizational note writing. This is also an opportunity for students to practice problems solving with other healthcare professionals.

INTD 4048. Art Rounds. 2 Credit Hours.

This is an interactive, interprofessional course that takes students to the McNay Art Museum to learn physical observation skills. Studies demonstrate that increased observational skills translate to improved physical examination skills. Using artwork as patients, students will have the opportunity to learn how to observe details and how to interpret images based on available evidence. Taught jointly by Health Science Center faculty and McNay museum educators, students will have the opportunity to develop and hone their observation, problem solving, and assessment skills. They will also observe, interpret, and give case reports on the original works of art to teach them the skill of verbalizing descriptions of what is seen, and not to accept assumptions made with a first impression. Open for Cross Enrollment on Space Available Basis.

INTD 4058. Hospice and Palliative Medicine Elective. 4 Credit Hours.

This rotation offers clinical experience in Hospice and Palliative Medicine (HPM). Palliative care provides treatment for seriously ill hospitalized and ambulatory patients and focuses on symptom management, enhancement of function, physical comfort, quality of life, psychosocial support, and communication about the goals of medical care for the patients as well as their families.

INTD 4103. Communication Skills. 0.5 Credit Hours.

To introduce fourth year medical students to the principles of conducting public interviews, presentations and effectively disseminating information to the communities they will serve.

INTD 4104. Improving Patient Outcomes. 0.5 Credit Hours.

This course is designed to increase a student's knowledge of and skills in identifying systemic problems with health care delivery and patient safety, collecting and analyzing data, generating solutions, presenting results and evaluating peers. The course objectives include facilitating systems thinking, exposing students to the ACGME general competencies (with emphasis on practice-based learning and improvement and systems-based practice), increasing understanding of health care economics and working in teams.

INTD 4105. Medical Jurisprudence. 0.5 Credit Hours.

The course will center on the Texas Medical Practice Act and applicable federal laws.

INTD 4106. Practical Ethics For Healers. 0.5 Credit Hours.

The course is the capstone of the four-year longitudinal curriculum in humanities and ethics. The goals are to reflect upon 1) physician's values, attitudes, and their intersection with cultural values and attitudes; 2) the historical and moral traditions of medicine in the context of society, politics, spirituality, and the health care system; and 3) the personal identity of a doctor. Open for Cross Enrollment on Space Available Basis.

INTD 4107. The Skin Around Us: A View of Skin Disease from a Humanities Perspective. 4 Credit Hours.

This elective is for fourth year medical students with a special interest in learning about skin diseases through a humanities perspective. Throughout the four week course, students will attend daily clinics, create a project and write an essay on activities encountered during the elective. The students will also complete brief writing assignments each week after watching videos, movies, and/or reading books.

INTD 4108. Bridging the Gap: Transition from UME to GME. 4 Credit Hours.

Medical education is changing with the introduction of a United States Licensure Medical Examination (USMLE) Step 1 scored on a pass/fail basis, increasing focus on the Undergraduate Medical Education to Graduate Medical Education transition, and changes to the residency application process. No longer can medical students wait until their senior academic year to prepare for USMLE Step 2 and discern their chosen specialty. In this course, which is to be delivered during the spring immediately prior to their senior year, medical students will be given instruction on specialty discernment and trained in test preparation techniques. Specialty discernment requires various forms of advising and mentoring. In this course, students will receive general instruction on the process of specialty discernment and will use online resources to prepare for residency applications in the context of academic metrics, specific program requirements, and specialty-based resources. The transition from undergraduate to graduate medical education is one of intense focus. While the transition seems as if it has a marked delineation, it exists on a continuum. In order to support the active process of creating goals, students need to reflect on their experiences as a clerkship student and create expectations of themselves in the context of their chosen specialty and career. Goal orientation in the context of mastery orientation defines success in terms of how well the knowledge, skills, and abilities have been demonstrated. (Cutrer, et al.) This type of goal orientation requires reframing and additional advising depending on the phase of the learner. Test preparation does not have to be separate and dedicated from the medical curriculum. In fact, directing learners to recognize opportunities to use exam preparation to build and apply more clinically-minded strategies, even when the content of the exam may not focus on clinical reasoning or diagnosis, might better prepare them to learn from their patients and to apply similar strategies later on. (Swan Sein, et al., 2021). By creating learning structures that facilitate this environment, medical students can use test preparation and test taking skills beyond the testing center. Prerequisites: at least 1 clerkship.

INTD 4110. Getting Ready to Teach During Your Residency Program. 0.5 Credit Hours.

The goal of this 8-hour course is to help senior medical students, who will be residents in a few months, develop teaching skills that will enhance the quality of their interactions with students. The course will be conducted in an interactive workshop format to allow participants to practice important teaching skills for residents. These include 1) orienting and priming students to their responsibilities and roles and accepting the personal role of teacher and role model, 2) giving feedback to improve student performance, 3) helping students to improve their patient presentations-the use of questioning, and 4) coaching procedural and technical skills. The participants will practice these skills and receive feedback from their course peers and instructors based on the guidelines for clinical teachers in action with students and provide critiques. Large and small group discussions and role plays will be used to reinforce teaching principles.

INTD 4115. Advanced Electronic Health Record Training (EPIC Based). 4 Credit Hours.

The primary learning objective of this elective is to prepare students for advanced use of the EPIC EMR in clinical and research environments. Successful completion of this course provides a formal certification as a Physician Builder in EPIC. That designation will permit students to take advantage of advanced features in EPIC as they advance in their careers. The course is broken down into two sections: Physician Builder-Basic and Physician Builder-Advanced. This course is a requirement for students enrolling in the MD/MS in AI dual degree program but is available to all medical students in good standing at the LSOM. Students must have a working familiarity with the EPIC EMR. One way to establish this familiarity is to have completed a clinical rotation in which EPIC EMR was utilized as a part of the assigned clinical work. Course fees: If the student is not part of the MD/MS in Artificial Intelligence dual-degree program, fee for the EPIC training course will need to be paid by student.

INTD 4205. Veritas Mentors in Medicine Longitudinal Elective. 2 Credit Hours.

This is longitudinal elective and the course work requirements will be for 2 week credit and must be complete by March 1st. Evaluation of MiM performance will include feedback from faculty mentors and students.

INTD 4210. School of Medicine Research Elective Level 1. 4 Credit Hours.

Medical research is multidisciplinary and broad in scope. Students will participate in basic, clinical research, quality improvement, or patient safety research projects under the supervision of faculty in the Health Science Center. The goal of this elective is to immerse students in a rich scholarly environment and provide an opportunity to work with research/faculty mentors to fully engage in a scholarly research process from writing the proposal to collecting the data to disseminating results. This elective is open to students who already have an established working relationship with a faculty member and who wish time to continue their work, students who wish to establish a new project, and for students who are in the MD-MPH degree program and MD with Distinction in Research Program. Interested students must submit a research elective application which includes the faculty mentor the student will work, to the office of UME, no later than 12 weeks before the research elective is to begin. Applications will be reviewed and confirmed or declined no later than 8 weeks prior to the proposed start date of the elective. Students will be able to 1) Formulate a research question and identify a research methodology to answer that question; 2) understand research ethics and apply an ethical approach to research design, implementation, and dissemination 3) design a research study and gather quality data; 4) apply and interpret basic biostatistics relevant to the individual research project; 5) write scientific reports. The supervising faculty member will evaluate the performance of the student using a standard, research specific, medical student evaluation form. Students will receive a Pass or Fail summative grade at the conclusion of the 4 week elective. Faculty will be expected to give the student formative feedback after two weeks to assist the student in meeting all expectations to pass the elective.

INTD 4211. School of Medicine Research Elective Level 2. 4 Credit Hours.

Medical research is multidisciplinary and broad in scope. Students will participate in basic, clinical research, quality improvement, or patient safety research projects under the supervision of faculty in the Health Science Center. The goal of this elective is to immerse students in a rich scholarly environment and provide an opportunity to work with research/faculty mentors to fully engage in a scholarly research process from writing the proposal to collecting the data to disseminating results. This elective is open to students who already have an established working relationship with a faculty member and reflects their increasing experience with the research process. INTD 4210 Level 1 elective or evidence of past experience knowledge and/or skills is a prerequisite. The expectation is that enrolled students will continue with research experiences begun in INTD 4210 Level 1 including students pursuing the MD-MPH degree and MD with Distinction in Research. Interested students must submit a research elective application which includes the faculty mentor the student will work, to the office of UME, no later than 12 weeks before the research elective is to begin. Applications will be reviewed and confirmed or declined no later than 8 weeks prior to the proposed start date of the elective.

INTD 4212. School of Medicine Research Elective Level 3. 4 Credit Hours.

Medical research is multidisciplinary and broad in scope. Students will participate in basic, clinical research, quality improvement, or patient safety research projects under the supervision of faculty in the Health Science Center. The goal of this elective is to immerse students in a rich scholarly environment and provide an opportunity to work with research/faculty mentors to fully engage in a scholarly research process from writing the proposal to collecting the data to disseminating results. Students enrolled in this course will have prior experience with research and ongoing research activities. As such, this elective is open to students who already have an established working relationship with a faculty member and reflects their increasing experience with the research process. INTD 4211 Level 2 elective is a prerequisite. As with INTD 4211 Level 2, the expectation is that enrolled students will continue with research experiences begun in INTD 4210 Level 1 and INTD 4211 Level 2 including students pursuing the MD-MPH degree and MD with Distinction in Research or produce evidence of past experience knowledge and/or skills which are deemed equivalent to these prerequisites. Interested students must submit a research elective application which includes the faculty mentor the student will work, to the office of UME, no later than 12 weeks before the research elective is to begin. Applications will be reviewed and confirmed or declined no later than 8 weeks prior to the proposed start date of the elective. Students will be able to formulate a research question and identify a research methodology to answer that question; understand research ethics and apply an ethical approach to research design, implementation, and dissemination; design a research study and gather quality data; apply and interpret basic biostatistics relevant to the individual research project; write scientific reports. The supervising faculty member will evaluate the performance of the student using a standard, research specific, medical student evaluation form. Students will receive a Pass or Fail summative grade at the conclusion of the 4 week elective. Faculty will be expected to give the student formative feedback after two weeks to assist the student in meeting all expectations to pass the elective.

INTD 5005. Core Course 1: Biochemistry. 2 Credit Hours.

Topics to be covered include: protein structure; properties of enzymes; structure, biosynthesis, and function of lipids; pathways and regulation of carbohydrate metabolism and biosynthesis and regulation of amino acids, nucleotides, and related compounds. Prerequisites: consent of instructor.

INTD 5007. Advanced Cellular And Molecular Biology. 4 Credit Hours.

This course provides an in-depth learning experience that instructs students on the fundamentals of molecular biology and cell biology as well as prepares the student to evaluate and design new research in the cutting-edge areas of modern molecular biology and cell biology. The course combines a didactic program of lectures along with a small group discussion format in which students interact closely with a group of faculty who have active research programs. The course focuses on active areas of research in molecular biology: Chromatin structure, DNA Transcription, DNA Replication and Repair, Recombination, RNA processing and regulation, Protein processing, targeting and degradation and in cell biology: Cell Signaling and Communication, Cell Growth, and Cell Death. Each week, the faculty provide students with didactic lectures on a current research area. Students and faculty will then jointly discuss key publications that serve to bridge the gap between the fundamental underpinnings of the field and the state of the art in that area.

INTD 5013. Perio/Pros/Endo/Orth Interdisciplinary Course 1. 1 Credit Hour.

A seminar that brings together the residents and graduate staff from the periodontic, prosthodontic, endodontic and orthodontic postdoctoral programs to share clinically relevant multidisciplinary information. Patient diagnostic evaluations and treatment plans are evaluated in an interactive environment. Selected topics involving new advancements are presented and discussed.

INTD 5021. Dental Biomed Core 2. 1 Credit Hour.

This course is a continuation of MSDS 5020 Dental Biomedical Core Course 1.

INTD 5023. Research Ethics. 1 Credit Hour.

The goal of this course is to provide the Master's student an opportunity to gain the essential standards necessary for training and education approved by the National Institute of Health. This course links to the web-based NIH Clinical Research Training On-Line Course <http://www.cc.nih.gov/training/training/crt/infor.html> for Principal Investigators that is required for all individuals conducting research. This course is open to current Health Science Center students. Open for Cross Enrollment on Space Available Basis.

INTD 5031. Common Interprofessional Educational Experience - LINC. 0 Credit Hours.

(1) Introduce students to IPE at UT Health San Antonio using the shared IPE framework as defined in the QEP (2) Facilitate interprofessional socialization (3) Prepare students for IPE activities they will experience as part of program-specific IPE plans.

INTD 5032. TeamSTEPPS - Interprofessional Education Course. 0 Credit Hours.

TeamSTEPPS is an evidence-based set of teamwork tools, aimed at optimizing patient outcomes by improving communication and teamwork skills among health care professionals.

INTD 5035. UTeach. 2 Credit Hours.

The course is designed for post-doctoral fellows, senior graduate students, faculty members, research staff and residents who are interested in a career in teaching and desire to acquire knowledge about learning processes and to develop educational planning, teaching and assessment skills to enhance their "teaching toolkit." UTeach (formerly University Teaching Excellence Course; UTEC) participants practice key skills needed for success in college-level teaching, working individually and in teams to accomplish course objectives. Classes will be supplemented by readings, worksheets and self-assessment inventories. Although the course will provide instruction in contemporary pedagogic techniques, it primarily emphasizes teaching science courses for undergraduates on campuses at predominantly undergraduate institutions (PUIs), rather than teaching graduate students and medical / dental students at the health science center (HSC) or other academic HSCs. Course instructors include faculty from the Schools of Medicine, Dentistry and Nursing at UTHSCSA as well as visiting faculty from local PUIs, St. Mary's University and Our Lady of the Lake University. UTeach has been offered for three consecutive fall semesters now (2015, 2016, 2017). It is sponsored by the San Antonio Biomedical Education and Research (SABER) Program that is supported by an Institutional Research and Academic Career Development Award (IRACDA) from the National Institute of General Medical Sciences of the NIH (PHS grant, K12 GM11726).

INTD 5036. Simulation IPE Experience -- LINC. 0 Credit Hours.

The LINC Simulation IPE Experience builds on the fall common IPE experience and occurs in the spring semester. Conceived and supported by the LINC Academic Affairs Council and housed within the LINC Faculty Councils Didactic IPE Initiative, the purpose of this university-wide IPE activity is threefold: (1) introduce students to simulation at UT Health San Antonio; (2) facilitate interprofessional socialization; and, (3) prepare students for IPE activities they will experience as part of program-specific IPE plans. Students complete the LINC Simulation IPE Experience in interprofessional groups of 3-4. Interactivity is emphasized as student groups work through 5 hours of instruction, including interprofessional socialization activities, mini-lectures, illustrated case studies, video case studies, and interprofessional discussions rooted in problem-based learning. Prerequisites: INTD 5031.

INTD 5040. Fundamentals Of Neuroscience1: Molecular, Cellular, & Developmental Neuroscience. 2 Credit Hours.

This course is intended to introduce students to a broad survey of the basics of molecular, cellular and developmental neuroscience. The course is organized into a series of three modules: biochemical and cellular properties of nervous system cells, development of neuronal systems, and neurotransmission and neuromodulation, which covers the fundamentals of these three areas. Current topics and concepts are discussed in discussion sessions that include student participation. Two components; Neuroscience students register for both PHYL 5041 and INTD 5040.

INTD 5043. Fundamentals Of Neuroscience 2: Systems Neuroscience. 3 Credit Hours.

This course, the second component of our broad survey of the basics of neuroscience, begins at the level of the neural circuit, and guides the students through an understanding of increasingly complex levels of organization and function in the brain. Topics include neurotransmitter systems, sensory and motor function, motivated behavior, regulation and integration of autonomic, behavioral, and emotional responses in the limbic system, higher order cognitive processes, and the neurobiological basis underlying some important psychiatric disorders and their treatment.

INTD 5046. Metanalysis In Cognitive Neuroimaging. 2.5 Credit Hours.

The objective of this course is to familiarize students with human functional brain imaging methods, experimental designs, statistical analyses, inferential strategies, and content. Students are guided through a literature-based research project that culminates in a quantitative metanalysis of a set of studies using similar tasks.

INTD 5047. Neuroanatomy. 2 Credit Hours.

The purpose of this course is to provide students with a practical working knowledge of the structure of both the peripheral and central nervous system. The emphasis will be on the organization of the human brain, although the brains of other species may also be included if appropriate for a specific brain region. The course will look at each of the individual components of the central nervous system in some depth but will also emphasize the complex integration of these various components into a functional brain. The topics covered in the course are specifically designed to mesh in time with those covered in Fundamentals of Neuroscience 2 describing the function of these areas. For this reason, it would be best if these two courses were taken concomitantly. The course will be didactic with digital images, models, and wet specimens included in the course.

INTD 5051. Research Methodology and Evidence-Based Practice. 2 Credit Hours.

This course is designed to introduce dental residents and faculty to critical thinking, research methodology, and evidence-based practice skills.

INTD 5064. Applied Statistics for Health Care Practitioners. 3 Credit Hours.

This online course focuses on the application of descriptive and inferential statistics in research studies. Students are expected to gain knowledge and skills that will enable them to understand, interpret, and evaluate statistical results; work with a consultant statistician; and use software to enter, analyze, and summarize data. Course requirements include homework assignments, online discussions and/or chats, and periodic projects.

INTD 5066. Laughter is the Best Medicine: An Interdisciplinary Elective about Humor, Healing, and Healthcare. 1 Credit Hour.

This class is a serious look at humor! The physiological and psychological benefits of humor, as well as its therapeutic use with patient interactions, will be explored. Students will learn how to develop and improve their personal use of humor to combat burn out, through techniques to enhance coping skills and stress reduction. Student participation and interaction is integral to the content delivery.

INTD 5067. Introduction to Programming for Biologists. 3 Credit Hours.

This course covers fundamentals of computer programming. It is designed and tailored for biologists in three ways: 1) students can pass it with minimal mathematical background, 2) when possible, examples and exercises are based on biological data analyses, and 3) it prepares students for other courses that are focused on bioinformatics techniques and tools. The topics are similar to the first introductory course that a student would take in a computer science program including: An introduction to Unix operating systems (i.e., Linux and macOS), basic command line and terminal usage; The Emacs text editor; Using simple data structures including vectors, matrices, lists, and classes; Conditional statements; Loops; Functions; Debugging; Organizing computational biology experiments and Code repositories and version control systems including Git. While this course is based on R, students are expected to be able to self-teach other high-level programming languages including Python, Matlab, etc. after learning fundamentals of programming in this course. Students will learn skills that are essential for visualization, statistical analysis, machine learning, analyzing next generation sequencing data, and other bioinformatics analyses. Open for Cross Enrollment on Space Available Basis.

INTD 5074. Topics In Translational Medical Product Development. 1 Credit Hour.

It is crucial to understand the intricate process of translating basic research into market driven products, navigate the complex pathways of intellectual property management and the regulatory affairs of agencies such as the FDA. This course will offer students in biomedical sciences the opportunity to integrate industry-relevant training and experience with their basic science education. The course will explore the marketing and regulatory process by which a biomedical product is developed and brought to commercialization.

INTD 5075. Complementary Healthcare for the Clinician. 0 Credit Hours.

The goal of this elective is to introduce future doctors to practices outside of the classical medical school curriculum that promote an evidence-based approach to wellness. This is so that the medical students of the UTHSC School of Medicine are informed about the reality, evidence and rumor surrounding a variety of commonly used alternative and supplementary healthcare practices. The of this class is not to make the student an expert in areas such as acupuncture or yoga, but to be well informed of the role of such practices as it relates to patient treatment and wellness. To this end, all the classes will have a practical component which will allow the students to experience the alternative modalities in a structured setting.

INTD 5081. Topics In Cardiovascular Research. 1 Credit Hour.

This course is designed to familiarize students with the current literature related to cardiovascular disease. Each week a different research topic selected from the recent literature is presented and discussed. Students are expected to attend and participate in the discussions. In addition, students are required to prepare and present once during the semester. A list of previous and current course presentations will be available online.

INTD 5082. Responsible Conduct of Research. 1.5 Credit Hour.

This foundational course introduces students to core ethical content necessary for responsible research conduct. Through interactive seminars, students will learn about (1) scientists as responsible members of society (contemporary ethical issues in biomedical research and environmental/social impacts of research), (2) policies for research with human subjects and vertebrate animals, (3) collaborative research, (4) conflicts of interest (personal, professional, financial), (5) data acquisition and laboratory tools (management, sharing, ownership), (6) responsible authorship and publication, (7) mentor/trainee responsibilities and relationships, (8) peer review, and (9) research misconduct (forms of misconduct and management policies).

INTD 5091. Special Topics. 1-4 Credit Hours.

This is a placeholder course, for which graduate students may register, if they are unable to select a specific track core course at the time of registration. Tracks are: Biology of Aging, Cancer Biology; Cell and Molecular Biology; Genetics, Genomics, & Development; Membrane Biology & Cell Signaling; Metabolism & Metabolic Disorders; Microbiology & Immunology; Molecular Biophysics & Biochemistry; Molecular, Cellular, & Integrative Physiology; Neuroscience; and Pharmacology. The course may be repeated for credit.

INTD 5094. Independent Study. 1-4 Credit Hours.

This elective allows for detailed in-depth study in a specific area of study. The area and mode of study are to be agreed upon by the student and instructor. The course may be repeated for credit when the area of study varies. Clock hours are to be arranged. Prerequisites: Graduate standing and consent of instructor.

INTD 5101. Health, Equity and the Environment. 1 Credit Hour.

This course will introduce IPE to UT Health San Antonio (UTHSA) students through an elective course called, Health, Equity and the Environment that will focus on knowledge of environmental health disparities and skills that empower students to actively work to reduce disparities and promote wellbeing in their patients and communities. The purpose of this course is to determine the impact of the IPE course on developing IPE teams/teamwork and communication competencies relative to environmental health knowledge and its intersection with health equity. UTHSA students will complete IPE competencies pre-post surveys, a course evaluation and conduct a community service learning (CSL) activity to evaluate their understanding of IPE and environmental health and inequities. Open for Cross Enrollment on Space Available Basis.

INTD 6002. Ethics In Research. 0.5 Credit Hours.

This course covers topics relevant to ethics in scientific research. The course is taught on a case-study basis, dealing with real and hypothetical situations relevant to the conduct of scientific research. Topics discussed will include, but will not be limited to: data management, peer review, recognizing scientific misconduct, authorship, and The University of Texas regulations relevant to human and animal research. This course is required of all doctoral graduate students.

INTD 6007. Advanced Cell Biology. 2 Credit Hours.

This course provides an in-depth learning experience that instructs students on the fundamentals of cell biology as well as prepares the student to evaluate and design new research in the cutting-edge areas of modern cell biology. The course combines a didactic program of lectures along with a small-group discussion format in which students interact closely with a group of faculty who have active research programs. The course focuses on active areas of research in cell biology: Cell Signaling and Communication, Cell Growth, and Cell Death. Each week, the faculty jointly discuss key publications that serve to bridge the gap between the fundamental underpinnings of the field and the state of the art in that area. Students and faculty will then jointly discuss key publications that serve to bridge the gap between the fundamental underpinnings of the field and the state of the art in that area.

INTD 6008. Mitochondria & Apoptosis. 1 Credit Hour.

This course will focus in depth on Mitochondria and Apoptosis. Topics will include: Mitochondria and Respiration; Mitochondria and Reactive Oxygen Species; Mitochondria and Apoptosis. It will provide an opportunity for a unique learning experience where the student can prepare to evaluate and design new research in the cutting-edge areas of modern cell biology and molecular biology. Instead of a didactic program of lectures, the entire course comprises a small-group format in which students interact closely with a group of faculty who have active research programs. Each week, faculty will provide students with a brief overview of the research area. Students and faculty will then jointly discuss key publications that serve to bridge the gap between the student's prior understanding of the field and the state of the art in that area.

INTD 6009. Advanced Molecular Biology. 2 Credit Hours.

This course will provide an in-depth learning experience on the fundamentals of molecular biology as well as prepare the student to evaluate and design new research in the cutting-edge areas of modern molecular biology. The course combines a didactic program of lectures along with a small-group discussion format in which students interact closely with a group of faculty who have active research programs. The course focuses on active areas of research in molecular biology: Chromatin structure, Transcription, DNA Replication and Repair, Recombination, RNA processing and regulation, Protein processing, targeting and degradation. Each week, the faculty provide students with didactic lectures on a current research area. Students and faculty then jointly discuss Key publications that serve to bridge the gap between the fundamental underpinnings of the field and the state of the art in that area.

INTD 6011. Introduction To Science Of Teaching. 1 Credit Hour.

This course will provide insight into the basic skills of learning and teaching. Faculty from the Academic Center for Excellence in Teaching and the Graduate School will provide the opportunity to learn the skills, strategies, and experiences for a future in academia and teaching. Topics include lecture presentations on why scientists choose to teach, planning a student learning experience in addition to developing a lecture syllabus, curriculum and teaching portfolio and philosophy. The course is recommended for Supervised Teaching Course INTD 6071.

INTD 6014. Perio/Pros/Endo/Orth Interdisciplinary Course 2. 1 Credit Hour.

This seminar brings together the residents and graduate staff from the periodontic, prosthodontic, endodontic and orthodontic postdoctoral programs to share clinically relevant multidisciplinary information. Patient diagnostic evaluations and treatment plans are evaluated in an interactive environment. Selected topics involving new advancements are presented and discussed.

INTD 6019. Pharmacotherapeutics. 1 Credit Hour.

This course is designed to review general principles of pharmacology; current and accepted pharmacotherapy for the medical management of pain, infection, and selected systemic diseases; and associated adverse drug events. It is based on the top 200 drugs dispensed by U.S. community pharmacies for the prevention, diagnosis, and/or treatment of disease with special reference to dentistry.

INTD 6035. Introduction to R and Unix/Linux. 0.5 Credit Hours.

Computational biology is a rapidly emerging subfield of biomedical science. Acquiring basic computational skills will enable biologists to better understand and analyze "big data" and use novel approaches to answer biological questions. In addition, it will improve communication with computational scientists and bioinformaticians, thereby enhancing collaborations. The course consists of two modules. The first 5-week module is designed to gain familiarity with R coding. The second 3-week module covers working in the Unix/Linux environment and the use of shell scripts. This course will be taught in the form of interactive hands-on computer classes in combination with homework assignments. No prior knowledge of programming or coding is required. This course is designed to prepare students for more advanced computational biology course work, such as INTD 6062 and CSAT 6095. Open for Cross Enrollment on Space Available Basis.

INTD 6037. Analytical Methods in Biomedical Research. 1 Credit Hour.

This three-week interactive course introduces students to fundamental methodologies used to analyze cells and biomolecules including nucleic acids and proteins. Principles, procedures, advantages and limitations of routinely used methods will be discussed. By the end of this course, the student should be able to: Define the principles and procedures underlying cell culture, isolation of cell organelles, cell proliferation, tissue embedding, sectioning and staining, define the principles and procedures underlying methods to quantify and manipulate nucleic acids, define the principles and procedures underlying methods to quantify proteins and determine protein-protein interactions, list the common methodologies used to generate mouse models for biomedical research.

INTD 6038. Biomedical Fundamentals. 3 Credit Hours.

This course will cover diverse topics in molecular and cell biology, physiology, immunology and neuroscience including innate and adaptive immunity, cell signaling, protein trafficking, cell adaptation and cell death, stem cells, and membrane physiology. Interactive lectures based on a flipped classroom approach will be followed by small group presentations and discussions focusing on critically evaluating scientific publications relevant to the lecture. The course will also include student presentations of their ongoing research. By the end of this course, a student should be able to: explain in-depth the topics covered during the course, describe and discuss research publications in a wide variety of disciplines within the life sciences, critically analyze, interpret and evaluate scientific publications or presented research updates, identify and present emerging topics in their field of interest (as defined by the research of their mentor). The course is for PREP-UT Health Link students.

INTD 6040. Resident Lecture Series in Psychiatric Disorders and Psychopharmacology. 1 Credit Hour.

This is an interdisciplinary advanced elective in which students attend 17 lectures from the Psychiatry Year One Residents' lecture series. These lectures focus on the psychopathology, epidemiology, and pharmacological treatments for illnesses such as schizophrenia, anxiety disorders, trauma related disorders, eating disorders, and sleep disorders.

INTD 6041. Basic Science Resident Lecture Series In Neurology. 1.5 Credit Hour.

This is an interdisciplinary advanced elective in which students attend 20 lectures, selected from the full offering of daily one-hour lectures comprising the Neurology Residents' Basic Sciences lecture series. These lectures cover a range of topics, such as Epilepsy, Movement Disorders, the Thalamus, Parkinson's Disease, Alzheimer's Disease, Stroke, Sleep, etc., all given from a clinical perspective. In addition, graduate students will have the opportunity to observe or participate in at least two enrichment activities related topically to the lectures they attend, which may include such settings as case presentations, diagnostic training sessions, or clinical observations, again selected from the list of offerings included in the "Neurology Residents" series.

INTD 6045. Clinical Practicum In Neuroscience. 1 Credit Hour.

This course will provide students with a brief, but intense and very focused exposure to clinical practice in a relevant area of their choosing, designed and coordinated to best match their interests in close individual collaboration with a clinical mentor in one of the participating components: Neurosurgery, Neurology, Psychiatry, or Endodontics. Representative activities could include participation in case presentation and treatment planning, attending rounds with physicians and residents, direct observation of clinical procedures, patient interviews, follow-up care and outcome review. Potential venues may include inpatient psychiatric ward, sleep clinic, epilepsy clinic, stroke clinic, neurosurgical theater and surgical ICU. In consultation with the course director, students will first select one of the following sub-sections, then design their individually tailored clinical practicum experience with the coordinator for that section.

INTD 6046. Resident Lecture Series in Psychiatric Disorders and Psychopharmacology II. 1 Credit Hour.

This is an interdisciplinary advanced elective in which students attend lectures, selected from the full offering of weekly two-hour lectures comprising the Psychiatry Year One Residents' lecture series. These lectures cover a range of topics, such as Substance Abuse, Depression, Bipolar Disorder, etc., all given from a clinical perspective.

INTD 6062. Next-Generation Sequencing Data Analysis. 2 Credit Hours.

Next-generation sequencing (NGS) is becoming increasingly commonplace in biomedical research. For many labs, the main bottleneck to implementing NGS applications is data analysis. This course is designed to introduce students to bioinformatics analysis of NGS data. The course consists of two modules: the first module covers working in the Unix/Linux environment, mapping NGS data to a genome of interest, and performing downstream analysis of RNA-seq, ChIP-seq, and ATAC-seq data. The second module will be an introduction to the programming language Perl, which will enable students to perform custom bioinformatics analysis. This course will be taught in the form of interactive hands-on computer classes. No prior knowledge of programming or coding is required.

INTD 6070. Teaching Excellence And Academic Skills (Texas). 1 Credit Hour.

This course, designed to assist graduate students and faculty in acquiring teaching skills, is composed of four modules, each covering a range of topics from lecture and clinical teaching to instructional development to assessing student achievement.

INTD 6075. Practical Machine Learning. 2 Credit Hours.

This practical approach to machine learning in the biomedical sciences will be mostly problem set- and discussion-based. Background information will be delivered in short lectures on datasets and machine learning concepts. Our plan is to discuss encoding data, training models, and evaluating model performance, including dimensionality reduction, regularization to reduce overfitting, and optimization of method hyperparameters through grid and random searches, with models drawn from linear and logistic regression, random forest classifiers, multi-layer perceptrons, neural networks (feed-forward, recurrent, graph, convolutional, and adversarial), and variational auto-encoders. Each problem set will cover a different area, including chemical structures and properties, metabolite profiles and cancer diagnosis, DNA sequence and transcription factor binding sites, and intratumoral gene expression and patient survival. One problem set and one 2-hour discussion (30 minutes lecture, 30 minutes concept discussion, 1hr problem set progress discussion) every week. The final problem set will be a capstone project where the students implement methods of their own choosing and compete to achieve the best model performance. Open for Cross Enrollment on Space Available Basis.

INTD 6076. Translational Biomedical Product Development. 1 Credit Hour.

Translational Biomedical Product Development is a course that will provide students with an understanding of the overall process of translating basic research into innovative, market-driven biomedical products (therapeutics, biologics, diagnostics, and devices). It covers the complex pathways of intellectual property management and the regulatory processes by which a bioscience product is developed and brought to commercialization. Focused lectures will include pre-clinical development, patenting, FDA and regulatory requirements, clinical trials, marketing, funding, licensing, and commercialization strategies. Case studies of both successful and unsuccessful biomedical products will be presented to explore various business development opportunities. Upon successful completion of this course, students will have a comprehensive knowledge of the complex regulatory ecosystem of biomedical product development and management. Prerequisites include appropriate undergraduate courses in Biochemistry, Molecular Biology or Pharmacology, as assessed by the course director. Prerequisites: BIOC 6035 Open for Cross Enrollment on Space Available Basis.

INTD 6097. Research. 0.5-12 Credit Hours.

This course is intended for first-year IMGP students only. Students will be required to attend a minimum of 10 departmental (any) seminars during the semester and submit a 100-150 word synopsis of each seminar within two weeks of the seminar.

INTD 6115. Perio/Pros/Endo/Ortho Interdisciplinary Course 3. 1 Credit Hour.

This is a seminar that brings together the residents and graduate staff from the periodontic, prosthodontic, endodontic and orthodontics postdoctoral programs to share clinically relevant multidisciplinary information. Patient diagnostic evaluations and treatment plans are evaluated in an interactive environment. Selected topics involving new advancements are presented and discussed.

INTD 7001. Flow Cytometry: Principles and Applications. 2 Credit Hours.

This course will cover the principles of flow cytometry, the components of cell analyzers and cell sorters, the applications of different assays in flow cytometry and the interpretation of flow cytometry data. Flow cytometry plays an essential role in helping to elucidate cell phenotype characterization and function in both clinical and research settings. The purpose of this course is to bring students up-to-date on the technology of flow cytometry and to help them gain knowledge in how to apply this tool for patient diagnosis as well as basic and translational research.

INTD 7002. Neurobiology Of Learning And Memory. 1 Credit Hour.

This course will focus on recent findings and topics related to the underlying aspects of the neural basis of learning and memory. Students will have the opportunity to learn about: molecular basis of memory formation, consolidation and retrieval, memory and emotion, associative learning, memory and amnesia, and recognition memory and the medial temporal lobe. The lectures will be interactive and driven by discussions of key journal articles. Each week the first hour will be reserved for lecturing and the second hour will be reserved for a discussion of a journal article.

INTD 7003. Elective in International Medicine. 4 Credit Hours.

This elective serves as a vehicle for students to participate in international medicine rotations. Students will work with a faculty sponsor to identify a program, either a pre-established site or a site discovered by the student which requires faculty approval. This elective includes: 1) The Center for Medical Humanities and Ethics International Scholars Program in India, a competitive program requiring a separate application through the department of Medicine, 2) Shoulder to Shoulder program in Latin America, which requires a separate application process and some cost (airfare and small project fee), and is available October, January, and April, 3) Programs in Nicaragua, Mexico, Panama, and Guatemala, and 4) Other sites available through online directory: <http://www.globalhealth-cc.org/GHEC/Resources/GHonline.htm>. All rotations share a commitment to service learning - medical education and self-reflection that arises out of service to needy populations. Students spend up to 4 weeks (or possibly longer) living in an international site and participating in the care of patients, under the supervision of local and visiting health care providers. The clinical settings and caseload will vary based on the location. There may be opportunities for patient education and emphasis on efforts of local empowerment, aiming to build up the communities in a sustainable way. Students will be expected to integrate themselves into the health care delivery system, and when possible, to strive to make an impact through community education and home visits. For certain Latin American sites, fluency in Spanish is a prerequisite. Students are encouraged to seek similar service learning experiences with underprivileged populations in San Antonio and Border communities prior to or after the rotation. End of rotation "reflection essays" are required and will serve to process student experiences.

INTD 7005. Indian Health Care Preceptorship. 4 Credit Hours.

This elective offers the opportunity for an experience in the health care of Native Americans, coordinated through the Indian Health Service. Most experiences involve both inpatient and outpatient care under direct supervision of board certified family physicians or internists. Educational activities such as conferences, teaching rounds, etc., may vary from site to site. All clinical sites are located outside the state of Texas, including sites in New Mexico, Arizona and Alaska. Early application is recommended. Students completing appropriate application forms may be reimbursed for transportation costs and provided room and board by the Indian Health Service.

INTD 7006. Biomarkers in Health Care Research and Delivery. 1 Credit Hour.

This course provides a broad overview of the rapidly evolving use of biomarkers in health care research and health care delivery. Biomarkers are non-subjective (i.e., not symptom scores, disability scales, or diagnoses) physical or functional measurements that serve as quantitative indices of physiological processes, pathological processes, and responses to exposures or interventions (including therapeutic interventions) that are intended to enhance the rigor and reproducibility of health care research and care delivery. Federal agencies, including the Food and Drug Administration (FDA), the National Institutes of Health (NIH) and the Institute of Medicine (IOM) are deeply engaged in promoting the use of biomarkers, introducing multiple funding opportunities for biomarker development toward FDA qualification and/or regulatory approval for clinical use. Additionally, opportunities for commercial partnership during biomarker development will be discussed. Examples will be provided of fluid (serum, CSF, urine, etc.), tissue, imaging, and biometric biomarkers (including wearable devices). Course format will emphasize assigned readings/viewings from various sources (IOM white papers, FDA & NIH video and powerpoint presentations, recent biomarker validation publications, current biomarker qualification submissions, relevant regulatory guidance, funded-grant synopses, et cetera) followed by in-class review and discussion. Special topic lectures will be delivered by invited speakers ranging from established biomarker researchers to regulatory experts. Open for Cross Enrollment on Space Available Basis.

INTD 7007. Medicine through Literature. 2 Credit Hours.

In this course you are required to read short stories, poems, and a book of nonfiction. While many of the stories or poems directly address medical or ethical issues, the primary purpose is not to enhance your store of knowledge in these areas, but to promote your appreciation of these works through discussions with other students (online via Canvas discussions and in class) and with authors and lecturers. Your own contributions to the course - not just the insights you've gained as medical students but the wisdom you bring to the class as human beings - will be critical to its success. We hope that the readings will help you prepare for and process your clinical experiences, furthering your development as a person as well as physician. There will be no "right" or "wrong" answers in this course; rather, our goal is to encourage thoughtful and serious responses to the readings and a lively and fulfilling conversation about them and the issues they raise. MSIV students will receive two credits for completion of this longitudinal elective. All students are expected to participate in class discussions. Grades are earned by reading assignments, attendance at class meetings, and posting primary and secondary responses to posted discussion questions. Open for Cross Enrollment on Space Available Basis.

INTD 7020. Clinical Patient Management. 5 Credit Hours.

This course is designed to help students develop skills in clinical behavioral dentistry through small group discussions, lectures, and routine patient treatment by application of the principles of coordinating patient care; communicating effectively with colleagues, staff, and faculty; and managing time, records, and environment. The students are required to manage their comprehensive care patients in the Junior Clinic following the principles presented in this course.

INTD 7074. Topics In Translational Medical Product Development. 1 Credit Hour.

It is crucial to understand the intricate process of translating basic research into market driven products, navigate the complex pathways of intellectual property management and the regulatory affairs of agencies such as the FDA. This course will offer students in biomedical sciences the opportunity to integrate industry-relevant training and experience with their basic science education. The course will explore the marketing and regulatory process by which a biomedical product is developed and brought to commercialization.

INTD 7091. Independent Studies. 1-9 Credit Hours.

Students will have the opportunity to use this course to study for the National Board, Part II examination, according to their own need. This course also will serve as a framework for a student returning from a leave of absence or from other protracted time away from classes or clinic. At the conclusion of the course, the enrolled student must demonstrate knowledge and/or skills and/or values consistent with the expectations for entering the level of course study from which the student left. An individualized course of study will be developed once the student is enrolled.

Courses**ORTH 5010. Introduction to Orthodontics. 0.5 Credit Hours.**

The expected to gain understanding of basic clinic operations, laboratory procedures and collection of orthodontic database including study models, photographs, and orthodontic clinical exams.

ORTH 5011. Orthodontic Techniques. 1 Credit Hour.

This course is designed to present to the students all modern orthodontic techniques, approached and appliance. The prerequisite for the course is solid biomechanics and understanding of importance of setting specific treatment goals for each patient. Discussions are led by the instructor on the cases treatment by the residents where the theoretical knowledge is applied.

ORTH 5012. Orthodontic Lab Technique. 0.5 Credit Hours.

The students are exposed to didactic teaching and practical hands on instruction about the design and fabrication of various orthodontic appliances including removable appliances, retainers and special custom designed appliances for complex orthodontic patients.

ORTH 5013. Orthodontic Treatment Planning. 0.5 Credit Hours.

The principles of the initial and advanced treatment planning are presented in this case based course. The student will learn how to effectively use databases including cephalometrics and 3-D imaging into making treatment decisions and presenting the treatment options to the patient.

ORTH 5014. Literature Seminars. 0.5 Credit Hours.

The students are taught to critically analyze and present current orthodontic literature, make effective presentations and learn how to categorize a research study within the hierarchy of research publications.

ORTH 5015. Orthodontic Biomechanics. 1 Credit Hour.

This course is designed to equip the student with knowledge of basic biomechanics and utilization of fundamental physical principles in orthodontics. It includes application of biomechanical principles in the design of the appliance and predictable tooth movement to achieve orthodontic movement goals.

ORTH 5020. Clinical Orthodontics 1. 1 Credit Hour.

During this clinical course, the student will be exposed to and learn all modern orthodontic techniques, approaches and appliances through treatment of about 65 orthodontic patients started by the student. In addition, about 20 transfer cases will be assigned to each student at the beginning of each year. The course will result in clinical competency of the student and preparation of at least six board quality cases for certification straight out of the residency program.

ORTH 5021. Clinical Orthodontics 2. 4 Credit Hours.

During this clinical course, the student will be exposed to and learn all modern orthodontic techniques, approaches and appliances through treatment orthodontic patients with several malocclusion and patients with craniofacial deformities started by the student, in addition understand the marketing side of orthodontics.

ORTH 5026. Clinical Orthodontics 2. 4 Credit Hours.

During this clinical course, the student will be exposed to and learn all modern orthodontic techniques, approaches and appliances through treatment orthodontic patients with several malocclusion and patients with craniofacial deformities started by the student, in addition understand the marketing side of orthodontics.

ORTH 5028. ABO Literature Review. 1 Credit Hour.

This series of seminars focuses on the literature required by the American Board of Orthodontics for the written board examination which the residents take during the spring semester of the second year. The seminars include in-depth coverage of the presented articles and topics and board-provided materials for preparing for the board written exam.

ORTH 5030. Case Analysis Seminars 1. 1 Credit Hour.

In this series of seminars, one resident is selected for each class to present a case of their choice with an in-depth analysis of the development of treatment planning, design of the appliance, and progress and outcome of the treatment. Other students in the audience are encouraged to ask questions and develop a discussion about the case and treatment approaches used.

ORTH 5035. Current Literature Review 1. 1 Credit Hour.

During this series of seminars attended by multiple of orthodontic faculty, the residents are presenting selected papers on current orthodontic topics. The seminars include in-depth discussion of the methodology, design of the study, interpretation of the results and conclusions based on the presented results. This course is designed to familiarize the student with all areas of current orthodontic literature and is a supplement to all didactic courses.

ORTH 5037. Orthodontic Lecture Series 1. 1 Credit Hour.

This series of orthodontic didactic lectures is a multifaceted course taught by several faculty during the course of the program. The topics covered in the course include periodontal consideration in orthodontics, orthodontic radiology, oral pathology, anatomy and histology and principles of growth and development.

ORTH 5070. Practice Management. 0.5 Credit Hours.

The practice Management course for orthodontics is an orthodontic specialty course designed to teach residents tools in managing a successful practice.

ORTH 5090. Research 1. 0.5 Credit Hours.

Following the course on Research Methodology, the student meets with the faculty and attends presentations on research topics from which he/she can select the topic of interest for the research project. Several components of that course throughout the duration of the program include understanding of research topics of interest to clinical orthodontics, design of clinical study and practical laboratory research on the selected project under the guide of student's research mentor.

ORTH 6000. Introduction to Advanced Orthodontics for Interns. 1 Credit Hour.**ORTH 7073. Junior Orthodontic Lectures And Case Analysis. 1 Credit Hour.**

This advanced lecture/case presentation series emphasizes the principles of orthodontic diagnosis and treatment planning for limited orthodontic procedures and the principles of comprehensive orthodontic therapy, interdisciplinary dentistry, and orthognathic surgery.

Courses**PATH 4001. Hematology - University Hospital. 4 Credit Hours.**

During this selective, through daily experience, consultations, and conferences, students will have the opportunity to learn to use CBCs, blood films, bone marrow studies, and other hematologic laboratory data in the diagnosis of basic hematologic, lymphoid, and coagulation disorders. This selective can be tailored according to the needs of individual students. The student interested in primary care can become involved in the performance of common laboratory tests done in the office. Daily contact with the pathologist will provide guidance in selection and proper utilization of laboratory testing for a specific patient's problem. For the student interested in pathology and laboratory medicine, the organization, management, maintenance of quality control, and consultative role of the Hematology Laboratory will be emphasized. During the selective period, a student may be assigned to spend one week in flow cytometry, molecular genetics, or cytogenetics.

PATH 4002. Blood Banking. 4 Credit Hours.

This selective is to acquaint the student with transfusion practices including the indications, dosage, expected benefits and risks of the different blood components, and the performance of therapeutic apheresis. The student will also be exposed to basic immuno-hematology and blood-banking techniques of acquiring, processing, testing, and transfusing blood components. Under the direction of the pathologist, a transfusion medicine fellow, a pathology resident, and a technical specialist in blood banking, the student will be required to perform basic techniques, participate in resolving the problems of patients having difficulties in transfusion, and evaluate the appropriateness of transfusion episodes. The selective can be tailored to offer more experience in transfusion practices for patient care or in organization, management, quality control, and other factors important to the student who may consider laboratory medicine as a chosen field. Students are required to participate in consultations and education programs offered by the blood bank.

PATH 4003. Hematology/Blood Banking. 4 Credit Hours.

This combination selective between the Hematology Laboratory and the Blood Bank may be arranged if student so desires.

PATH 4012. Anatomic Pathology: Fine Needle Aspiration. 4 Credit Hours.

Students will be given the opportunity to learn the technique of fine needle aspiration (FNA) biopsy. Direct supervision by faculty, cytology fellow and/or pathology resident in the method of specimen procurement and preparation of the FNA specimen occurs after initial instruction by the course director or their designee for palpable lesions. Participation at radiologically guided or endoscopically guided FNAs is also observed. Students are required to learn basic Modified-Giemsa staining with preliminary evaluation for adequacy of aspirate. There will be exposure to basic interpretation of FNA material from smears and cell blocks with emphasis on selection of ancillary testing along with clinical correlation. A separate clinic time is NO longer available and FNAs are done on an "on-call" basis from UHS cytopathology. Exposure to other areas of anatomic pathology that pertain to quality improvement of clinical medicine skills will also be made available. The experience may be customized depending on the student's future interests (pathology as a future vocation versus students planning on other fields of medicine).

PATH 4013. General Pathology Rotation (an overview of Anatomic and Clinical Pathology). 2 Credit Hours.

Pathologists play many roles in medicine. Roles range from interpreting surgical biopsies to supervising clinical laboratory testing. It has been estimated that 70% of all medical decisions are based on data generated by pathology departments. This elective is designed to introduce the student to the practice of pathology and the role of the pathologist in diagnosis and management, and will provide exposure to several subspecialty areas within the pathology department. This rotation is intended either for those interested in pathology as a career, and those interested in broadening their understanding of pathology in general, or in relation to their chosen field. This two or four week elective will expose the medical student to the fields of Anatomic and Clinical Pathology including surgical pathology, cytopathology, autopsy pathology, hematopathology, transfusion medicine, and microbiology. In anatomic pathology, students will have the opportunity to partake a range of experiences, including supervised observation or active participation of prosection of surgical specimens, microscopic evaluations, frozen section evaluations, participate and observe in immediate adequacy assessment of samples for image guided fine needle aspirations/ core needle biopsies and participate in autopsy procedures as available. In clinical pathology, the student will participate in the diagnosis of blood and bone marrow disorders, transfusion reaction evaluation and provision of blood, among other experiences. In general, students will attend: 1) an introductory guided tour of clinical and anatomic laboratories/ departments with an overview of diagnostic testing and methods, 2) required lectures and teaching sessions 3) and at least 2 multidisciplinary case conferences (tumor boards). At the end of the rotation, students are expected to deliver a 10-20 minute presentation at the clinical pathology conference (laboratory medicine conference) and/or the anatomic pathology grand rounds conference. Open for Cross Enrollment on Space Available Basis.

PATH 4015. Forensic Pathology. 2 Credit Hours.

Daily responsibilities include the observation of forensic autopsies. Other responsibilities will include crime scene investigation, courtroom, and/or deposition exposure. During the rotation period, the student is expected to spend some time within the toxicology laboratory and must arrange this with the chief toxicologist. Near the end of the rotation, the student is expected to present a talk on a topic of current forensic interest to the staff during weekly case review. The student will be assessed by attendance, type and frequency of activities performed, and subjective evaluations by the medical examiner staff. This forensic pathology rotation must be pre-approved by the course director for both time period and length of rotation; recommended during the fourth year of medical school following core rotation in general autopsy and surgical pathology, though those rotations are not required.

PATH 4104. Naturopathic Medicine: Evidence-Based Critique. 0.5 Credit Hours.

This course strives to overcome the animosity between conventional and unconventional medicine by openly discussing and evaluating some of the naturopathic methods using the tools of evidence-based medicine. The objective of this course is to build basic knowledge about the mainstays of naturopathic medicine such as phytotherapy, acupuncture and other reflexologies, Asian and European dietary systems, as well as stimulatory methods such as fasting and homeopathy. For each of these systems, diagnosis and treatment will be discussed from the evidence-based perspective.

PATH 4105. Evidence Based Medicine In Everyday Practice. 0.5 Credit Hours.

This course includes theory and methodological foundation, definitions and overview of evidence-based medicine, practical considerations, and reporting in evidence-based medicine.

PATH 4290. Clinically Applied Laboratory Medicine (CALM). 0.5 Credit Hours.

This course is an eleven-contact-hour mandatory course in laboratory medicine for MSIV students. Offered during the spring semester, the course is taught by members of the Pathology Department using patient case scenarios to illustrate laboratory medicine aspects of patient care management. An introductory one-hour lecture is presented to the entire class as a whole to provide course format information and small-group assignments. Groups of twenty-five to thirty students are formed based upon medical/surgical specialties; a student is assigned to a group according to chosen specialty. Patient cases are selected to emphasize important laboratory medicine points pertinent to a particular specialty.

PATH 5030. Oral Histopathology. 1 Credit Hour.

The course will review the histopathologic features of oral diseases. Cases signed-out on the Oral & Maxillofacial Pathology Biopsy Service will be discussed in a conference format utilizing a multiheaded microscope. Correlation of the histologic findings with the clinical and radiographic presentation of oral disease processes will be emphasized. Students will have the opportunity to learn the basis of surgical pathologic diagnosis and related ancillary special studies.

PATH 5035. Oral Pathology. 2 Credit Hours.

Clinicopathologic correlations, differential diagnosis, and therapeutic rationale are emphasized. The integration of history, physical findings, and clinical laboratory data with pertinent radiographic findings, clinical presentations, and anatomic pathology will be emphasized.

PATH 6026. Graduate Oral and Maxillofacial Pathology - Clinicopathologic Conference 1. 1 Credit Hour.

This course is presented in the first semester and consists of 16 one-hour sessions of instruction conducted as case conferences utilizing radiographic, histopathologic, and clinical projected glass slides and Kodachromes. Students present assigned literature reviews and cases emphasizing radiographic and histopathologic changes; discussions follow. Students include those from Oral and Maxillofacial Surgery, Periodontics, Endodontics, and Dental Diagnostic Sciences.

PATH 6027. Graduate Oral and Maxillofacial Pathology Clinicopathologic Conference 2. 1 Credit Hour.

This course is a continuation of PATH 6026 Grad Oral/Maxillofacial Path 1. It is presented in the second semester and consists of 17 one-hour sessions of instruction conducted as case conferences utilizing radiographic, histopathologic, and clinical projected glass slides and Kodachromes. Students present assigned literature reviews and cases emphasizing radiographic and histopathologic changes; discussions follow. Students include those from Oral and Maxillofacial Surgery, Periodontics, Endodontics, and Dental Diagnostic Sciences. Prerequisite: PATH 6026.

PATH 7000. Off Campus. 4 Credit Hours.

All off campus rotations must be approved by the designated faculty member prior to the beginning of the rotation (at least one week before the course begins). Credit will not be given for any rotation that has not been approved in advance. Required paperwork includes: "Course Approval" form, a written letter or email for acceptance from the physician preceptor with the start and end dates of the course/rotation, and a course description of your learning objectives and responsibilities during the rotation. Forms must include a complete address and telephone number for the off campus location or residence address for the student while at the off campus site. Forms will not be approved after the rotation has already begun. Contact the department for assistance with enrolling in this course.

PATH 7023. Oral & Maxillofacial Pathology: Clinicopathologic Conference. 1 Credit Hour.

This course is a series of 14 clinicopathologic conferences presented in an interactive case-based/clinical problem-solving format. Students will be expected to apply their fund of basic science knowledge learned in the prerequisite didactic pathology courses to simulated dental practice situations. Cases will be discussed systematically utilizing the S.O.A.P. format (Subjective, Objective, Assessment, Plan). Students are required to complete and turn in a worksheet and self assessment for each case. Students are expected to read articles from current scientific literature posted on the course site and take the online challenge examinations. Lectures on the critical topics of head and neck cancer and skin cancer will be given by the course director.