MOLECULAR IMMUNOLOGY & MICROBIOLOGY

Sample Plan of Study

First Year

Fall		**Credit Hours**
IBMS 5000	Fundamentals Of Biomedical Sciences	8.0
IBMS 5008	Lab Rotations	3.0
TSCI 5070	Responsible Conduct of Research	2.0
	Total Credit Hours:	**13.0**

First Year

Spring		**Credit Hours**
CSAT 5095	Experimental Design And Data Analysis	3
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	1.5
MICR 5025	Eukaryotic Pathogens	1.0
MICR 5026	Bacterial Pathogenesis	1.0
MICR 5028	Virology	1.0
MICR 6052	Advanced Immunobiology	3.0
	Total Credit Hours:	**12.0**

Second Year

Fall		**Credit Hours**
CSAT 6005	Rigor & Reproducibility	1.0
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	5.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
MICR 5029	Building Scientific Thinking Skills	2.0
MICR 5090	Research Progress Report	1.0
Advanced Elective if needed		variable *
	Total Credit Hours:	**12.0**

Second Year

Spring		**Credit Hours**
IBMS 6090	Seminar(Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	7.5
IBMS 7001	Qualifying Exam (Class Section 5MIM)	1.0
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
MICR 5090	Research Progress Report	1.0
Advanced Elective if needed		variable *
	Total Credit Hours:	**12.0**

Third Year

Fall		**Credit Hours**
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	8.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
MICR 5090	Research Progress Report	1.0
Advanced Elective if needed		variable *
	Total Credit Hours:	**12.0**

Third Year

Spring		**Credit Hours**
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	8.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
MICR 5090	Research Progress Report	1.0
Advanced Elective if needed		variable *
	Total Credit Hours:	**12.0**

Fourth Year

Fall		**Credit Hours**
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	5.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
IBMS 7099	Dissertation (Class Section 5MIM) **	3.0
MICR 5090	Research Progress Report	1.0
	Total Credit Hours:	**12.0**

Fourth Year

Spring		**Credit Hours**
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Section 5MIM)	5.5
IBMS 7099	Dissertation (Class Section 5MIM) **	3.0
MICR 5090	Research Progress Report	1.0
	Total Credit Hours:	**12.0**

Fifth Year

Fall		**Credit Hours**
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Sections 5MIM)	5.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0

IBMS 7099	Dissertation (Class Section 5MIM) **	3.0
MICR 5090	Research Progress Report	1.0
	Total Credit Hours:	**12.0**

Fifth Year

Spring		**Credit Hours**
IBMS 6090	Seminar (Class Section 5MIM)	1.5
IBMS 6097	Research (Class Sections 5MIM)	5.5
IBMS 7010	Student Journal Club & Research Presentation (Class Section 5MIM)	1.0
IBMS 7099	Dissertation (Class Section 5MIM) **	3.0
MICR 5090	Research Progress Report	1
	Total Credit Hours:	**12.0**

* A minimum of one advanced elective is required. Since different electives vary in credit hours, research credit hours for a given semester should be adjusted in order to maintain a total of 12 credit hours for the semester. A menu of relevant electives from which courses may be selected is shown below. However, students may select, following approval of the student's supervising professor and discipline executive committee, any accredited course offered by any program at UT Health SA.

Relevant Electives

Primary Suggestions		
INTD 6062	Next-Generation Sequencing Data Analysis (Spring semester only)	2
INTD 7001	Flow Cytometry: Principles and Applications (Fall semester only)	2
Secondary Suggestions		
MICR 5035	Emerging Trends in Immunology and Infection (Not available all terms)	2
MICR 5095	Current Topics in Immunobiology and Host-microbe Interactions (Not available all terms)	1
BIOC 6010	Gene Expression and Omics	2
BIOC 6033	Cell Signaling Mechanisms	2
BIOC 6036	Macromolecular Structure & Mechanism	2
BIOC 6037	Integration Of Metabolic Pathways	2
BIOC 6043	Structure & Function Of Membrane Proteins	2
CSAT 5007	Methods In Cell Biology	1
CSAT 5023	Development (Spring semester only)	1
CSAT 5024	RNA Biology and Genomics II (Spring semester only)	1
CSAT 5025	Genome Informatics (Spring Semester Only)	1
CSAT 5083	Practical Optical Microscopy	1
CSAT 6005	Rigor & Reproducibility	1
CSAT 6021		3
CSAT 6048	Biology of Aging	4
CSAT 6049	Cellular and Molecular Mechanisms of Aging (Spring semester only)	2
CSAT 6050	Aging and Longevity Mechanisms (Spring semester only)	2
CSAT 6059	Stem Cells & Regenerative Medicine (Spring semester only)	1
CSAT 6068	Cancer Biology Core 1: An Introductory Course (Spring semester only)	2
CSAT 6069	Cancer Biology Core 2; Advanced Cancer Biology (Spring semester only)	2.5
CSAT 6074	Molecular Aspects Of Epigenetics	2
CSAT 6095	Analysis and Visualization of Genomic Data (Spring semester only)	2
INTD 6007	Advanced Cell Biology	2
INTD 6009	Advanced Molecular Biology	2
INTD 6008	Mitochondria & Apoptosis	1

** A minimum of 2 semesters of IBMS 7099-5MIM (Dissertation) is required for graduation. A student may begin enrolling in IBMS 7099-5MIM once the Dissertation Research Proposal and the Dissertation Supervising Committee membership are approval by the GSBS Dean. Final hours (3.0 SCH) may be applicable for the final semester.

*** To expedite movement through the IBMS curriculum, MD PhD students are exempted in their GS1 year from the IBMS 5000 (Biomedical Sciences) and IBMS 5008 (Rotation) courses of the first Fall semester.

Courses

IBMS 5000. Fundamentals Of Biomedical Sciences. 8 Credit Hours.
This core course covers the fundamentals of biochemistry, molecular biology, cell biology, organismal and systems biology, and microbiology and immunology. The course is designed for first-year graduate students matriculating into the Integrated Biomedical Sciences Program (IBMS).

IBMS 5008. Lab Rotations. 1-3 Credit Hours.
This course provides an opportunity for students to participate in research activities in the laboratories of faculty members in different disciplines to learn laboratory skills and to gain an introduction to the research fields of faculty members.

IBMS 6090. Seminar. 1.5 Credit Hour.
This course is required of all students in the IBMS program, except of those who have signed up for Final Hours. Students are required to attend a minimum of 16 seminars per semester and to complete a requirement to demonstrate their attendance and participation. To fulfill the minimum number of seminars, students may include seminars offered by disciplines other than their own in which they are enrolled. However, to enroll, students should obtain permission from the course Section Director affiliated with the appropriate discipline. The course numbers of the individual course sections are INTD 6090-1GEN, 6090-2BA, 6090-3CB, 6090-4CGM, 6090-5MIM, 6090-6MBB, 6090-7NS and 6090-8PP for the IBMS Disciplines: Biology of Aging (BA), Cancer Biology (CB), Cell Biology, Genetics & Molecular Medicine (CGM), Molecular Biophysics & Biochemistry (MBB), Molecular Immunology & Microbiology (MIM), Neuroscience (NS), and Physiology & Pharmacology (PP). Some students who have not declared a discipline, and have obtained the approval of their academic advisor and the Senior Associate Dean of the GSBS, may sign up for INTD 6090-1GEN. Grading will be Satisfactory or Unsatisfactory. A list of seminars from all disciplines will be posted on the Graduate School Web site. Each Section Director will determine, for the relevant IBMS-6090 section, the policy for tracking student's attendance and participation in seminars.

IBMS 6097. Research. 0.5-12 Credit Hours.
This course involves independent, original research under the direction of a faculty advisor.

IBMS 6098. Thesis. 1-9 Credit Hours.
Registration for at least one term is required for M.S. candidates. Prerequisite: Admission to candidacy for the Master of Science degree is required.

IBMS 7001. Qualifying Exam. 1 Credit Hour.
The objective of the Qualifying Examination (QE) is to determine if a student has met programmatic expectations with regard to: i) Acquiring a level of scientific reasoning and a knowledge base in his/her field of study appropriate for a graduate student at the current stage of training; ii) Demonstrating skills of problem-solving and development of experimental strategies designed to test hypotheses associated with a specific scientific problem; and iii) Demonstrating the ability to defend experimental strategies proposed for solving scientific problems. Successful completion of the QE is required for Advancement to Candidacy and continuation in the IBMS Ph.D. program. During the Spring semester of Year 2 (4th semester overall) of the student's program, the QE will be administered by a faculty committee approved by a student's Discipline leadership. Each IBMS discipline will administer the QE process for its students so as to achieve the goals of the discipline while satisfying the expectations of the IBMS graduate program. In general, the QE requires the solving of a relevant unsolved problem in the biomedical sciences by writing a research proposal based on an idea conceived and developed by the student, followed by an oral defense-of-proposal to explore the student's problem-solving process, and the soundness of the student's experimental design. Following the QE, a report will be submitted by the chair of the examination committee to the student's discipline leadership indicating the outcome of the exam and any recommendations that may be required to foster further academic progress by the student. IBMS 7001 is divided into 7 modules overseen by the 7 IBMS Disciplines, each that is responsible for providing its students with a detailed description of the examination process, and for ensuring that the programmatic expectations and goals of the QE are met.

IBMS 7010. Student Journal Club & Research Presentation. 1-2 Credit Hours.
This course is designed to provide graduate students with experience in critical reading of the primary literature, seminar preparation and presentation, data analysis and interpretation, and group-based learning as they relate to the graduate program in Integrated Biomedical Sciences. This course is required of all students in the IBMS program starting in their second year except of those who have signed up for Final Hours. Students are required to attend a minimum of 16 total presentations per semester (journal club or research presentations) and to complete a requirement to demonstrate their attendance and participation. Students are also required to present one journal club presentation per semester until they are Advanced to Candidacy. Once Advanced to Candidacy, the student will present one journal club presentation per academic year and one research presentation per academic year such that the student is giving at least one presentation in each semester. To enroll, students should obtain permission from the course Section Director affiliated with the appropriate discipline. The course numbers of the individual course sections are INTD 7010-1GEN, 7010-2BA, 7010-3CB, 7010-4CGM, 7010-5MIM, 7010-6MBB, 7010-7NS and 7010-8PP for the IBMS Disciplines: Biology of Aging (BA), Cancer Biology (CB), Cell Biology, Genetics & Molecular Medicine (CGM), Molecular Biophysics & Biochemistry (MBB), Molecular Immunology & Microbiology (MIM), Neuroscience (NS), and Physiology & Pharmacology (PP). Some students who have not declared a discipline, and have obtained the approval of their academic advisor and the Senior Associate Dean of the GSBS, may sign up for INTD 7010-1GEN. Grading will be by letter grade (A, B, C, etc). A list of journal clubs from all disciplines will be posted on the Graduate School Web site. Each Section Director will determine, for the relevant IBMS 7010 section, the policy for tracking student's attendance and participation and will be responsible for assigning a final grade.

IBMS 7099. Dissertation. 1-12 Credit Hours.
This course involves independent, original research under the direction of a faculty advisor and is designed to allow graduate students time to write their doctoral dissertations and to receive guidance from their Dissertation Supervising Committees. Enrollment in IBMS 7099 with discipline designations typically requires course permissions which is granted by the discipline coordinator or director.

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 3031. Exploring Clinical Medicine- Module 1. 1 Credit Hour.
Exploring Clinical Medicine (ECM) is a longitudinal course across the clerkship year in which third-year medical students will learn about fundamental topics that are transcendent across specialties and are essential to the practice of clinical medicine. Learning activities are divided into three modules of thematically related content over the clerkship year. Modules will include a combination of required synchronous and asynchronous content. Each module will incorporate an OSCE. In ECM Module 1, the focus is on "Professional Communication." Topics include Communication in the Clinical Learning Environment and Difficult Patient Encounters. Completion of pre-clinical curriculum is required.

INTD 3032. Exploring Clinical Medicine- Module 2. 1 Credit Hour.
Exploring Clinical Medicine (ECM) is a longitudinal course across the clerkship year in which third-year medical students will learn about fundamental topics that are transcendent across specialties and are essential to the practice of clinical medicine. Learning activities are divided into three modules of thematically related content over the clerkship year. Modules will include a combination of required synchronous and asynchronous content. Each module will incorporate an OSCE. In ECM Module 2, the focus is on "Quality, Safety, Value." Topics include Patient-Centered & Cost-effective Care, Quality Improvement and Patient Safety, and Transitions of Care. Completion of pre-clinical curriculum is required.

INTD 3033. Exploring Clinical Medicine- Module 3. 1 Credit Hour.
Exploring Clinical Medicine (ECM) is a longitudinal course across the clerkship year in which third-year medical students will learn about fundamental topics that are transcendent across specialties and are essential to the practice of clinical medicine. Learning activities are divided into three modules of thematically related content over the clerkship year. Modules will include a combination of required synchronous and asynchronous content. Each module will incorporate an OSCE. In ECM Module 3, the focus is on "Social Concerns in Medicine." Topics include Human Trafficking, Climate Change, and Systemic Barriers to Health Care/Racial Disparities in Health Care. Completion of pre-clinical curriculum is required.

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 adjoint 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 4109. Non-Fiction Writing for Advocacy: A workshop and practicum. 2 Credit Hours.
The non-fiction writing practicum is a longitudinal writing workshop designed to equip motivated students with the basic skills necessary to serve as effective advocates-in-writing for patients, the profession of medicine, and population health. Open for Cross Enrollment on Space Available Basis.

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 4111. Fast Healthcare Interoperability Resources (FHIR) for Medical Students. 4 Credit Hours.
FHIR for Medical Students delves into Fast Healthcare Interoperability resources (FHIR). This course is tailored for medical student with experience in C#, Java, and/or JavaScript, this will also be a prerequisite for the course, and those aiming to develop their skills with SMART on FHIR and CDS Hooks. The curriculum is hands-on with exercises, enabling participants to learn by both developing and reviewing practical software applications. Prerequisites: Some fluency in Java, C# or JavaScript/Node.js.

INTD 4130. Medicine and Business Capstone I. 2 Credit Hours.
This longitudinal practicum integrates business and clinical perspectives to prepare future physician leaders to navigate and improve complex healthcare systems. Through a series of seminars on innovation, strategy, leadership, and value based care, students will engage with faculty to explore real world organizational challenges. Working in teams, students will apply MBA principles in a capstone project that bridges clinical insight with business application to generate actionable solutions for health system improvement. Project mentorship will come from course co directors as well as guest lecturers and other experts on campus. Enrollment in the MD/MBA dual degree program and completion of the one-year didactic coursework through the Alvarez College of Business is required.

INTD 4140. Medicine and Business Capstone II. 2 Credit Hours.
This longitudinal practicum integrates business and clinical perspectives to prepare future physician leaders to navigate and improve complex healthcare systems. Through a series of seminars on innovation, strategy, leadership, and value based care, students will engage with faculty to explore real-world organizational challenges. Working in teams, students will apply MBA principles in a capstone project that bridges clinical insight with business application to generate actionable solutions for health system improvement. Project mentorship will come from course co directors as well as guest lecturers and other experts on campus. Completion of the one year didactic coursework through the Alvarez College of Business as required for the MD/MBA dual degree program.

INTD 4150. Medicine and Business Capstone III. 2 Credit Hours.
This two week elective for students in the MD/MBA program serves as the culminating experience in the capstone sequence. Building on the work completed during the prior practicum, students synthesize their project findings into a professional presentation. The course emphasizes the development of soft skills essential for leadership, including creativity, communication, and teamwork. Whereas the earlier capstone courses focus on technical and analytical competencies, this elective provides dedicated time to refine the interpersonal and presentation skills required to convey complex ideas effectively in business and organizational settings. Completion of the one year didactic coursework through the Alvarez College of Business as required for the MD/MBA dual degree program. .

INTD 4151. Poverty, Health, And Disease Elective. 0.5 Credit Hours.
This elective course is offered to students who wish to gain insight into the complex interplay between poverty and health, both in the United States and in resource-limited settings around the world. The purpose of the course is to expose the students to several thought leaders and appropriate published literature, including books written to address these concepts. The course will explore the problems of inequality of access to health care and its impact on health delivery systems both globally and locally. This course is only open to 4th year students during the didactic sessions. Open for Cross Enrollment on Space Available Basis.

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 electives 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 4300. Advanced Generative AI. 4 Credit Hours.
This 4-week elective provides a comprehensive introduction to Generative AI technologies with a specific focus on applications in medicine. Through structured morning lectures, interactive demonstrations, hands-on exercises, and assignments, students will explore fundamental concepts and practical applications of Large Language Models (LLMs). Topics include data structures, vectorization, tokens, encoding/decoding, sentence transformers, fine-tuning techniques (PEFT/LORA), retrieval augmented generation, multimodal applications (visual/audio), and critical considerations regarding bias and legal implications in medicine. This course is exclusively for MS in AI students in good standing who have completed Capstone I. Students will complete daily homework assignments and a final project. The course is pass/fail, with grading based on attendance, participation, assignment completion, and the final project. Must be a MD/MSAI dual degree student. Prerequisites: INTD 4011.

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 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 Education Experience - LINC. 0 Credit Hours.
This course is intended to introduce students to IPE at UT Health San Antonio using the shared IPE framework as defined in the QEP, facilitate interprofessional socialization, and 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 Interprofessional Education 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 5037. Clinical Interprofessional Education Experience -- LINC. 0 Credit Hours.
The LINC Clinical IPE Experience builds on the fall and spring first year common IPE experience and occurs in the spring semester of the second/third year. 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 Clincial 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.

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 neutrotransmission 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, Mathlab, 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 underpinnnings 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 Psychoparmacology 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, Biopolar 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 6085. Advanced Machine Learning. 2 Credit Hours.
This advanced 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 advanced regularization techniques, convolutional and recurrent neural networks, generative adversarial networks, reinforcement learning and attention, transformer and NLP models, explainable AI, and ethical considerations. Each problem set will cover a different area of biomedical research. 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 kaggle competition where the students implement methods of their own choosing and compete to achieve the best model performance. Prerequisites: INTD 6075 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 7000. Functional Genomics and Disease Mechanisms. 1 Credit Hour.
This advanced graduate level course trains students to bridge human genetic discovery and mechanistic modeling using CRISPR based genome engineering and human induced pluripotent stem cell (iPSC) systems. The course is structured around critical analysis of recent high impact studies spanning genome wide association studies (GWAS), multi-omics, and functional validation in human cellular models. Through in depth discussion of landmark publications, students will learn how genetic signals are translated into experimentally testable mechanisms in human systems. Open for Cross Enrollment on Space Available Basis.

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. Imaging Biomarkers of Brain Disorders. 1 Credit Hour.
This course provides a broad overview of the evolving use of imaging biomarkers brain disorders. Biomarkers are non-subjective (i.e., not symptom scores, disability scales, or diagnoses) anatomical, physiological, genetic, biochemical, or actimetric measurements that serve as quantitative indices of physiological processes, pathological processes, and responses to exposures or interventions. Biomarkers enhance rigor and reproducibility of health-care research and delivery. Federal agencies, including the FDA, NIH, CDC and IOM all promote the use of biomarkers. 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 7009. HIV Out Loud: Building the History of an Epidemic. 2 Credit Hours.
This course acquaints students with oral history methods and specifically with the history and lived experience of HIV. Students will learn how to record oral history and will work closely with people living with HIV, advocates and family members to record a life history for the permanent "HIV Out Loud" archive in the Briscoe Library. Students will participate in 1 in-person orientation meeting and 3 required in-person sessions in which students will receive training on best practices and learn to record oral history. Subsequently, to receive credit for the course students will be required to attend 2 community events (such as tabling at World AIDS Day, attending HIV advocacy day, presenting on the project, etc), attend 3 virtual listening sessions, and either record an oral history for the archive or produce a paper or educational/analytical tool that uses the materials already archived. This course is a great fit for trainees interested in history, in HIV itself, and in advocacy.

INTD 7020. Clinical Patient Management. 4 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 7030. Tumor Immunology Working Group and Journal Club. 1 Credit Hour.
The Tumor Immunology Working Group and Journal Club is an advanced, interactive course designed for graduate students, postdoctoral fellows, and faculty with a keen interest in the field of tumor immunology. This course aims to foster a deep understanding of the intricate interactions between the immune system and cancer, exploring both the fundamental concepts and the latest advancements in cancer immunotherapy through research updates and cancer immunology-related papers. Additionally, it seeks to promote collaboration among participants and establish a student peer group with research interests in tumor immunology. Open for Cross Enrollment on Space Available Basis.

INTD 7040. Advancing Social Communication and Play. 1 Credit Hour.
Advancing Social-Communication and Play (ASAP) is a classroom-based intervention program designed to help teachers, therapists and paraprofessionals foster the development of important communication and play skills in children with autism spectrum disorders (ASD). This course equips the Project ASPIRE Scholars with essential knowledge and skills necessary for effectively applying the ASAP intervention approach within a classroom environment. Prerequisites: OCCT 7029 and OCCT 7115.

INTD 7050. Gross Anatomy. 6 Credit Hours.
This course provides a complete and detailed study of the structure and function of the human body including the study of human cadavers through guided prosections and dissection. The course is designed for the Doctor of Occupational Therapy (DOT) and Doctorate of Physical Therapy (DPT) programs and will focus on material most pertinent to the practice of OT and PT. Students will apply their theoretical understanding of clinically relevant structures and common disorders to their therapeutic practice. Course fees: $831.

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

MICR 4000. Special Topic. 4 Credit Hours.
This is a self-designed course created by both the student and the department to cover a specific topic. A Course Approval Form must be completed along with documentation of the designed course description.

MICR 5025. Eukaryotic Pathogens. 1 Credit Hour.
The course will provide students with the opportunity to gain a basic comprehensive understanding of parasitology and mycology. The first part of this course will focus on virulence mechanisms and the host immune response with respect to a variety of parasites that cause major human diseases. The second part of this course will cover several important areas of medical mycology including molecular biology, diagnostic/epidemiology, mating/phenotypic switching, morphology, pathogenesis, and antifungal therapies.

MICR 5026. Bacterial Pathogenesis. 1 Credit Hour.
This is an introductory course in microbial pathogenesis focusing on bacterial pathogens that are important in human disease. Students will receive a foundation in the basic concepts and experimental approaches that are crucial for understanding the discipline through directed readings and didactic instruction. Specific concepts, strategies, and mechanisms used by human bacterial pathogens to cause disease will be illustrated.

MICR 5027. Immunology. 1 Credit Hour.
MICR 5027 is designed to build on the immunological concepts covered in MICR 5051 given in the Fall semester and to put those concepts to use as we focus on understanding the world of the mammalian host response to infection and on applying fundamental immunological concepts to the understanding of current immunological research questions in a student-presentation and in-class discussion format. Prerequisite: MICR 5051.

MICR 5028. Virology. 1 Credit Hour.
This course focuses on the molecular and cellular biology of animal viruses, and their interactions with host cells. Many of the viruses to be covered in this course are medically significant or have provided critical information that has expanded our understanding of cell biology, immunology, development, and differentiation.

MICR 5029. Building Scientific Thinking Skills. 2 Credit Hours.
The goal of this course is to provide the opportunity for graduate students to develop critical thinking skills in reading scientific literature, writing scientific grant proposals and manuscripts, and effectively communicating their own scientific ideas with peers. The course will be offered in three consecutive stages. First, each student will be assigned a scientific article focusing on a topic in the areas of Microbiology and Immunology and will give a 50 minute review presentation to the class. The content of the article will be discussed and reframed in the context of a grant proposal, followed by questions/critiques from fellow students and faculty members. Second, each student will be guided to develop a F31-style fellowship proposal on their chosen topic. Students are encouraged to work with their mentors to develop the proposal focused on their own research. The writing is expected to complete over the course of four weeks, after which feedback is provided by peers and MIMG faculty before a final draft is submitted. Finally, each student presents an oral mock qualifying exam (QE) defense of his or her final written proposal to the class and a mock QE committee composed of MIMG faculty members. This course is different from many other writing courses because it is designed to achieve multiple purposes: 1. Since the proposal writing and defense portions mimic the process involved in the MIM discipline QE with MIMG faculty, this course will serve as a practice for the QE (though all MIM students must write an entirely original QE proposal for actual QE); 2. Since the scientific proposal is fully spelled out and written in the format for F31 fellowship application, the student may use the same proposal for his/her F31 application; 3. Since the proposal focuses on the research of the thesis project, the discussions/critiques from the class will help the student to evaluate the feasibility and significance of his or her potential thesis project before investing too much into the project; 4. Finally, the three stages of this course have a long lasting impact on scientific skill development.

MICR 5031. Pathogenic Microbiology. 3 Credit Hours.
This lecture-only course integrates different disciplines (immunology, cell biology, genetics, biochemistry, molecular biology, physiology, and medical microbiology) with a central theme focused on molecular mechanisms of microbial pathogenesis in humans. Recommended prerequisites for this course are Biochemistry and Molecular Biology.

MICR 5035. Emerging Trends in Immunology and Infection. 2 Credit Hours.
An intense and advanced exploration of the primary literature focusing on the latest emerging trends in immunological research. The format will allow students to develop skills of in depth critical analysis and will involve a combination of student presentations of current data and discussions of the historical development and evolution of new directions in immunological research.

MICR 5051. Intro To Immunology. 2 Credit Hours.
This course is a study of immune responses with emphasis on experimental strategies for elucidating cellular and molecular mechanisms. Three phases of study: (1) immunochemistry and molecular biology of antibodies, lymphocyte receptors, and products of the major histocompatibility complex; (2) cellular interactions and immuno-regulation; and (3) immunopathologies (hypersensitivity, autoimmunity, immunodeficiency, transplantation rejection, and tumor immunology). Prerequisites: consent of instructor, courses in General Biology and Genetics recommended.

MICR 5090. Research Progress Report. 1 Credit Hour.
This course allows students to present a progress report on their research project in a formal setting. Students present a 50-minute seminar to members of the Molecular Immunology & Microbiology Discipline and the Department of Microbiology, Immunology and Molecular Genetics. Students are challenged to think independently and critically through practice of asking and answering critical questions as they organize their presentation, and they evaluate each other's research findings. This course serves as a mechanism for the students to develop and practice oral presentation skills in a friendly environment, learn to explain experimental rationale, scientific methods, results and their significance to colleagues. Research Progress Report (RPR) serves as a vehicle to encourage student productivity within the laboratory. The seminars are videotaped for review by the presenters.

MICR 5091. Current Topics In Microbiology And Immunology. 0.5-3 Credit Hours.
Students will be given an opportunity to gain in-depth understanding of selected topics in microbiology and immunology through a combination of library research and discussion with faculty. Prerequisites: consent of instructor.

MICR 5092. Special Problems. 1-9 Credit Hours.
The course provides an opportunity for the student to engage in a special research project or to develop proficiency in the use of certain laboratory methods. Prerequisites: consent of instructor.

MICR 5095. Current Topics in Immunobiology and Host-microbe Interactions. 1 Credit Hour.
This course is designed to enhance and expand on the existing Research Progress Report (RPR) course (MICR 5090) that is required of all graduate students in the Molecular Immunology & Microbiology discipline of the IBMS Graduate Program. Although the RPR course allows students to gain experience with regard to making formal lecture presentations of their research, it is limited in that students present their work only once a year, the opportunity for full discussion is limited by the time available after presentations, and being a course in which participants are exclusively students, there are no opportunities to observe examples of how skilled seasoned investigators (i.e., faculty and postdoctoral fellows) present their work. In the currently proposed course, graduate students will not only have more frequent opportunities to present their own research and receive vital feedback and critiques, but will also hear and critique presentations by more senior investigators regarding projects performed in labs throughout the Department of Microbiology, Immunology & Molecular Genetics. Prerequisites: MICR 5090.

MICR 6026. Advanced Molecular Genetics Of Eukaryotic Pathogens. 2 Credit Hours.
This course will cover the major research methods and techniques used to study human fungal pathogens.

MICR 6030. The Microbiome & The Associated Metabolites in Health and Diseases. 2.5 Credit Hours.
This course provides an overview on the role of the microbiome and the associated metabolites in human health and diseases. It will focus on clarifying the conceptual framework for understanding how microbiome and the associated metabolites, particularly gut microbiome, impact human health and well- being. The course will also introduce students to the technologies and approaches used to study the microbiome and the associated metabolites in human and murine models. Prerequisites: MICR 5051 Open for Cross Enrollment on Space Available Basis.

MICR 6043. Advanced Topics In Virology. 2 Credit Hours.
This course is an in-depth study of selected topics in animal virology at the molecular level. Prerequisites: consent of instructor.

MICR 6050. Advanced Topics In Tumor Immunology. 1 Credit Hour.
This course provides an opportunity for students to gain a solid foundation in modern tumor immunology. Topics include tumor antigens, autoimmunity, mechanisms of killing, dysregulation of inflammation, and counter measures mediated by tumor to thwart or subvert host immunity.

MICR 6052. Advanced Immunobiology. 3 Credit Hours.
MICR 6052 is composed of 2 separate Modules that are designed to build on the immunological concepts covered in IBMS 5000 given in the Fall semester and to put those concepts to use as we focus on understanding the world of the mammalian host response to infection. In addition, students will gain a more detailed understanding of the current concepts, approaches, and applications of research in the field of immunology. Module 1 is devoted entirely to understanding fundamental concepts in immunology primarily through lectures and including some in-class discussion. Module 2 is focused on applying fundamental immunological concepts to the understanding of current immunological research questions in a student-presentation and in-class discussion format. Prerequisites: IBMS 5000 or consent of instructor. Open for Cross Enrollment on Space Available Basis.

MICR 6071. Supervised Teaching. 1-9 Credit Hours.
This course consists of teaching under the close supervision of instructors as laboratory assistants and as leaders in tutorial or review sessions. The more advanced students may present formal lectures in the classroom or lead discussions in the laboratory. Prerequisites: consent of chair or department.

MICR 6097. Research. 1-12 Credit Hours.
This course consists of independent, original research under the direction of faculty advisor. May be conducted in bacteriology, virology, mycology, parasitology, and immunology.

MICR 6098. Thesis. 1-12 Credit Hours.
Registration for at least one term is required of M.S. candidates. Admission to candidacy for the Master of Science degree is required.

MICR 7099. Dissertation. 1-12 Credit Hours.
Registration for at least two terms is required of Ph.D. candidates. In addition, Ph.D. candidates may be required to complete a course in Biostatistics. Prerequisites: Admission to candidacy for the Doctor of Philosophy degree.