CELL SYSTEMS AND ANATOMY (CSAT)

Courses

CSAT 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.

CSAT 4001. Anatomy of the Newborn. 4 Credit Hours.
Detailed gross dissection and study of newborn specimen with special emphasis on developmental origins as well as features and relationships differing from the adult; combined with library study of developmental malformations. Course fees: Lab fee $30.

CSAT 4002. Regional Anatomy. 4 Credit Hours.
Anatomy associated with one of the usual medical or surgical specialties, such as gastroenterology, neurology, orthopedics, obstetrics and gynecology, etc. Activities include detailed dissection, presentation of dissected material, assigned readings, and individual project. Course fees: Lab fee $ 30.

CSAT 4005. Advanced Anatomy. 4 Credit Hours.
Selected students are required to participate in lectures, detailed dissections, presentations of prosected material, and teaching in the first year medical gross anatomy laboratory. Special projects, activities, and assigned readings in the surgical anatomy and history of anatomy literature. Course fees: Lab fee $30.

CSAT 4017. Advanced Neuroanatomy. 4 Credit Hours.
Selected students will be assigned a special project and readings in the neuro anatomical literature.

CSAT 4024. History of Anatomy In Situ: Reawakening & Development of Anatomy in the 14th - 18th Century Italy. 4 Credit Hours.
An in-depth study of the awakening and development of anatomy in 14th - 18th century Italy, visiting the sites where this occurred in Padua, Bologna, and Florence. The course consists of one week of didactic lectures and discussion prior to two weeks in Italy visiting anatomical museums and two of the oldest universities in the world, and ending with a week of student presentations based on a paper focusing on a historical, social, or scientific issue arising during this period in the Italian medical schools and currently relevant to the students' chosen field of medicine.

CSAT 4025. Anatomy Mentored Teaching. 4 Credit Hours.
The Mentored Teaching Elective allows 3rd and 4th year medical students to serve as teaching assistants for the spring CSAT 5022 Inter-professional Human Gross Anatomy course. CSAT 5022 serves students in the occupational therapy, physical therapy, physician assistant and biomedical engineering programs, and students in the Masters of Anatomy graduate program. Teaching assistants will serve as instructors for laboratory dissections which cover the central and peripheral nervous systems, vertebral column and back, the upper and lower limbs, head and neck, body wall, thorax, abdomen, pelvis, and perineum. Other teaching assistant duties include preparation of prosection specimens for teaching and demonstration, lab practical exam setup and grading, and preparation and presentation of a brief topical review relevant to anatomy. Applicants should have attained a minimum grade of B in Language of Medicine and in Musculoskeletal/Dermatology and exhibit the highest standards of professionalism. Enrollment is by permission of the Undergraduate Medical Education Office and by the course directors.

CSAT 5007. Methods In Cell Biology. 1 Credit Hour.
Through a combination of lectures and demonstrations, the instructors will introduce students to techniques which are currently being used in cellular biology laboratories. The emphasis will be on the applications themselves, their uses, limitations, and the necessary controls.
The following topic areas will be covered: imaging and microscopy, immunological techniques, bioinformatics (DNA and protein), rodent anatomy and histology, cytogenetics, and in vitro cell growth and transfection. Course fees: $100.

CSAT 5012. Physician Assistant Gross Anatomy. 5 Credit Hours.
This course will cover the basic principles of human anatomy. Lectures are correlated with laboratory sessions in which students will learn human gross anatomy of the adult through the study of cadaver prosections, bones, models, atlas drawings and radiographs. Emphasis will be placed on basic systems anatomy as they apply to the physician's assistant. Course Fees: Gross Anatomy fee $30.00.

CSAT 5015. History Of Anatomy. 2.5 Credit Hours.
The history of anatomy course is designed to acquaint medical, dental, and graduate students with the history of medicine and especially with the physicians and scientists who made essential discoveries in human anatomy. Using a biographical approach, the course is presented as a seminar with lectures, assigned readings and student presentations.

CSAT 5022. Clinically-Oriented Human Anatomy. 5.5 Credit Hours.
This course is designed to provide students with an in-depth understanding of whole-body human anatomy as it applies to clinical practice. This course teaches foundational anatomical relationships and common variations following a regional approach, with select topics receiving regional systemic emphasis. This includes correlating anatomy with clinical pathologies, procedures, and imaging through didactic lectures, gross anatomy prosection laboratory, and active learning sessions. Clinical cases will be incorporated in lecture and in laboratory to foster critical thinking skills necessary for students to use their anatomical knowledge to solve clinical problems. Humanism and professionalism, including compassion and empathy, are integrated into the course to help students form a healthy professional identity in the medical field. Course fees: Cadaver Fee $843, Lab Fee $30, Technology Fee $50.

CSAT 5023. Development. 1 Credit Hour.
The course provides a survey of concepts in developmental biology (induction, cell-cell interactions, morphogen gradients, morphogenetic movements, transcription regulation, organogenesis) using experimental examples from both invertebrate and vertebrate embryos. The first set of lectures will focus on gametogenesis, fertilization, and early developmental events, such as cleavage, midblastula transition, gastrulation, and axis formation. The second set of lectures will explore the fates of germ layers in the contexts of cell type-specific differentiation and cell-cell interactions during organogenesis.

CSAT 5024. RNA Biology and Genomics II. 1 Credit Hour.
The challenges of controlling RNA viruses, the promise of RNA vaccines and the recent findings on the roles of ncRNAs and RNA binding proteins in human disease highlight the importance of studying RNA biology. This course, coupled with MMED 6001, covers all aspects of RNA expression and metabolism, such as RNA processing, decay, transport, alternative splicing and translation and, the function of RNA binding proteins and non-coding RNAs. We will also discuss recent discoveries, such as RNA vaccines, RNA granules, RNA modification, the impact of RNA mediated processes in metabolic syndrome, neurodegenerative diseases and cancer and, RNA therapeutics. Another important goal of these courses is to teach students to employ omics methods such as RNA-seq, RIP-Seq, BRIC, CLIP, Ribo-seq, and CRISPR to study these processes and their regulators. This includes hands-on training on biological databases and classes covering examples of the use of genomics. We expect students to acquire skills that will help them visualize how RNA genomics can be used in their own research projects. Open for Cross Enrollment on Space Available Basis.

CSAT 5025. Genetics. 1 Credit Hour.
This course is designed to provide an overview of genetic research. Topics to be covered include: cytogenetics, mitochondrial genetics, cancer genetics, linkage analysis, complex traits, population genetics, animal models, sex determination, and epigenetics.

CSAT 5026. Stem Cell Biology. 1 Credit Hour.
This course is an up-to-date overview on current topics in stem cell biology. It is intended for the (future) basic scientist who is interested in studying the regulatory mechanisms of stem cells as well as for the (future) clinician who is interested in how stem cell biology will continue to impact patient care. Topics that will be discussed are: (1) basic biology and stem cells, including embryonic stem cells, adult stem cells, stem cells in different tissues and model systems; (2) microenvironment-mediated; (3) epigenetic regulators of stem cells; (4) stem cells in medicine, including regenerative medicine, cancer and aging; and (5) ethics.

CSAT 5033. Brain Health Journal Club. 1 Credit Hour.
A journal club with an emphasis on brain health. The scope of the journal club is broad, with topics ranging from molecular mechanisms to the impact of injuries on behavior. Brain injuries ranging from stroke, spinal cord injury and traumatic brain injury (TBI) to age-associated neurodegeneration will be emphasized. Scientific articles on relevant or state-of-the-art techniques will also be encouraged. On a rotating basis, participants will be expected to present to the group either a paper of interest and relevance to their work or an update on their ongoing research or some combination of the two. PowerPoint slides are discouraged in favor of a chalk talk when presenting to the group.

CSAT 5041. Neuroanatomy. 2.5 Credit Hours.
This neuroanatomy course builds the foundation required for students to learn neuroanatomy through didactic lectures, small group learning activities, and laboratory sessions. The course will look at the components of the nervous system and their integration into a functional system. Application of neuroanatomy concepts will be gained through hands-on laboratory sessions, drawing activities, and clinical cases. Open for Cross Enrollment on Space Available Basis.

CSAT 5045. Pre-Medical Biochemistry. 2.5 Credit Hours.
This course will introduce students to fundamental concepts in biochemistry and, importantly, discuss the application of biochemical principles in the clinical context. Open for Cross Enrollment on Space Available Basis.

CSAT 5046. Clinical Seminars. 1 Credit Hour.
The clinical seminars course will feature presentations from physicians practicing in several specialties at UT Health San Antonio, including faculty from General Surgery, Emergency Medicine, Psychiatry and Behavioral Sciences, Family and Community Medicine, Pediatrics, Urology, Pathology and Laboratory Medicine, OB-Gyn, Endocrinology, Cardiology, Dermatology, Rheumatology, Anesthesiology and others. The presentation would inform students about their interests that lead them to select their specialty, their schedule, what they like about your position as well as time commitments and challenges that entail that position, and any other information they would like to share with the students. The experience should give the students an understanding of future expectations, rationales for pursuing a medical degree, strategies used to matriculate into medical schools, and the different paths followed to specialize in different specialties.

CSAT 5060. Human Histology. 2.5 Credit Hours.
This course will examine the microscopic architecture of the human body, beginning with tissues, and then organs and their higher-level organization into systems performing specific functions. Topics covered will include basic tissues, the integumentary, cardiovascular, lymphatic, respiratory, gastrointestinal, endocrine, urinary, and male and female reproductive systems. The goal of this course is to enable students to acquire knowledge of the normal histological structure of organs and organ systems using light and electron microscopy, thereby providing a strong basis for a sound understanding of cell and tissue morphology in health and disease. The course will include lecture, laboratory, and self-directed as well as independent student learning. This course is restricted to students in the Cell Systems & Anatomy Pre-Professional and MS programs.

CSAT 5070. Introduction to Mechanisms of Disease. 2 Credit Hours.
This course will introduce learners to the general mechanisms of disease with an emphasis on differentiation between healthy and disease tissues and the underlying mechanisms which lead to various pathologies. The course will emphasize case-based studies and application exercises to reinforce the didactic material.

CSAT 5074. Introduction to Research. 0.5 Credit Hours.
This course is required of all MS students in the Anatomy Track in Cellular & Structural Biology and is available to the Biotechnology Track students. Students will have the opportunity to learn about the research interests of faculty in the program. This course will introduce students to the research strategies and help them identify a mentor and committee members.

CSAT 5077. Scientific Writing. 2 Credit Hours.
This course will provide students with the opportunity to develop skills in scientific writing and the presentation of research results. It will emphasize learning-by-doing-and-re-doing. Students will be required to write something every week. The capstone project for students will be to write a grant proposal and defend it in front of the class. One hour per week will be devoted to lecture and critique of published work; the other hour will consist of critique and revision of student writing by other students, as well as by the course director. Topics to be covered include: (1) fundamentals of writing clearly, (2) principles of revision, (3) effective presentation of data, (4) fundamentals of oral presentation, (5) writing/presenting to the appropriate audience, (6) how to write background/introductory sections, (7) how to write materials and methods, (8) how to write the discussion section, and (9) how to constructively critique one's own and others writing.

CSAT 5083. Practical Optical Microscopy. 1 Credit Hour.
This course will be a one-hour elective for graduate students consisting of eight (8) one-hour lectures plus eight (8) one-hour laboratories. The course focuses on the practical aspects of using optical microscopes. The objectives are to teach students the fundamental principles of optical microscopy and to provide them with hands-on experience using the optical instrumentation in the Institutional Imaging Core.

CSAT 5089. Graduate Colloquium. 2 Credit Hours.
This course is designed to provide graduate students with training in evaluating the scientific literature and in presentation of research in a seminar or journal club format. The course will focus on critical thinking, including evaluation of existing literature, interpretation of experimental results, and comparison of alternative models and interpretations. These tools are essential both for oral presentations and for writing grant proposals and manuscripts. Emphasis will be placed on evaluation of the science, organization of the manuscript, and on oral presentation skills.

CSAT 5091. Special Topics. 1-9 Credit Hours.
No description available.

CSAT 5095. Experimental Design And Data Analysis. 3 Credit Hours.
The purpose of the course is to provide an introduction to experimental design and statistical analysis. The emphasis of the course will be on the selection and application of proper tests of statistical significance. Practical experience will be provided in the use of both parametric and nonparametric methods of statistical evaluation. Among the topics to be covered are: data reduction, types of distributions, hypothesis testing, scales of measurement, chi square analysis, the special case of the comparison of two groups; analysis of variance; a posteriori multiple comparisons tests, tests of the assumptions of parametric analyses, advanced forms of the analysis of variance, linear regression, and correlation analysis. This course involves the use of statistical software; therefore, access to a laptop or a computer with web access for classes and examinations is required.

CSAT 6005. Rigor & Reproducibility. 1 Credit Hour.
This course will focus on two of the cornerstones of science advancement, which are rigor in designing and performing scientific research and the ability to reproduce biomedical research findings. The course will also emphasize the application of rigor that ensures robust and unbiased experimental design, methodology, analysis, interpretation, and reporting of results. The notion that when a result can be reproduced by multiple scientists, it validates the original results and readiness to progress to the next phase of research will be covered in this course. This is especially important for preclinical studies that provide the basis for rigorous clinical trials in humans. In recent years, there has been a growing awareness of the need for rigorously designed published preclinical studies, to ensure that such studies can be reproduced. The aim of this course is to help attendees acquire the skills necessary to meet the need to enhance rigor and reproducibility in preclinical scientific research. Successful completion of CSAT 5095, or an equivalent approved by the Rigor & Reproducibility course director, is a prerequisite for this course.

CSAT 6015. Selective Topics In Oncology: Gynecological Cancers. 2 Credit Hours.
This advanced elective course for the Cancer Biology Track provides a unique learning experience intended to prepare students in the emerging research areas of gynecological cancers for designing research experiments using pre-clinical and clinical research materials. The entire course comprises a small-group format in which students interact closely with a group of faculty who has active research or clinical programs focusing on molecular, clinical, and therapeutic areas of gynecological cancers.

CSAT 6021. Animal Models. 3 Credit Hours.
The relevant biology, applicability, and practical use of a number of animal models to biomedical research is covered. Invertebrate (e.g., C. elegans) and vertebrate (e.g., fish and rodents) model systems are included in the course. Strengths and weaknesses of each organism that render them particularly valuable as animal models are emphasized. Experimental approaches and tools that are utilized in conjunction with each animal model are rigorously examined. The course is taught from primary scientific literature using classic historical publications and recent publications.

CSAT 6040. Gross Anatomy Mentored Teach. 1 Credit Hour.
The Gross Anatomy Mentored Teaching Elective allow students in the Integrated Biomedical Sciences Program, School of Health Professions, and other qualified students to serve as preceptors for the spring CSAT 5022 Interprofessional Human Gross Anatomy course. CSAT 5022 serves students in the occupational therapy, physical therapy, physician assistant and biomedical engineering programs, and students in the Masters of Anatomy graduate program. Preceptors will serve as instructors for laboratory dissections which cover the central and peripheral nervous systems, vertebral column and back, the upper and lower limbs, head and neck, body wall, thorax, abdomen, pelvis, and perineum. Other preceptor duties include preparation of prosection specimens for teaching and demonstration, lab practical exam setup and grading, and preparation and presentation of a brief topical review relevant to anatomy. Students enrolling in this elective must have taken an approved human gross anatomy course (as determined and agreed upon by the course directors) with a minimum final grade of B within the previous five years.

CSAT 6048. Biology of Aging. 4 Credit Hours.
Biology of Aging is the core course of the Biology of Aging Track. The course consists of two modules: Aging and Longevity Mechanisms and Molecular and Cellular Mechanisms of Aging. The purpose of this course is to provide students with the most up-to-date information on the current understanding of the aging process. This advanced interdisciplinary graduate course provides experimental understanding of the interrelated areas of aging and age-related diseases. Faculty from several departments will be involved in teaching this course, which will cover the molecular and cell biology of aging, model systems used for aging studies, age-related changes in organs and tissues, and age-related diseases.

CSAT 6049. Cellular and Molecular Mechanisms of Aging. 2 Credit Hours.
This course provides up-to-date information on the current understanding of cellular and molecular mechanisms that contribute to aging. The focus is on investigation of specific mechanisms of aging including oxidative stress, nutrient sensing signaling pathways, stem cells and senescence, and genome stability. Experimental design and analysis, including pros and cons of approaches used to gain knowledge and how to appropriately interpret data, will be discussed throughout the course. The relationship between age-related changes in function and potential contributions age associated diseases will be examined via recently published research.

CSAT 6050. Aging and Longevity Mechanisms. 2 Credit Hours.
This module will focus on and evaluate several approaches used to modulate longevity and how these are used to discover the genetic, physiological and intracellular foundation of aging processes. The course will consist of interactive lectures complemented by guided reading of currently research papers. Students will be taught to hone critical reading skills and develop testable hypotheses to carry research forward. Topics will include: Genetics of Aging, Exceptional Longevity, Pharmacological Interventions, Calorie Restriction, Healthspan and Pathology of Aging.

CSAT 6058. Neurobiology Of Aging. 2 Credit Hours.
The nervous systems of many species, including humans, show obvious declines in function as a result of increasing age. In addition to the gradual decline observed in neural function, it is clear that increasing age also results in increased susceptibility of the nervous system to degenerative diseases such as Alzheimer's Disease, Parkinson's Disease, and Amyotrophic Lateral Sclerosis. This course will focus on recent findings and topics related to the underlying pathology of aging in the nervous system and the relationship of aging to neurodegenerative disease.

CSAT 6059. Stem Cells & Regenerative Medicine. 1 Credit Hour.
The fields of stem cells and regenerative medicine are rapidly evolving and have great potential to change the way medicine is practiced. This course will encompass topics from basics of tissue specific stem cell biology to pre-clinical animal models, strategies and progress in regenerative medicine. We will discuss some of the most current research being done in regenerative medicine from stem cell transplantation to biomaterials. Prerequisite: IBMS 5000.

CSAT 6060. Anatomical Sciences Thesis. 1-8 Credit Hours.
Designed as an alternative to a "bench research"- based thesis, this longitudinal course for the Anatomical Sciences track in the Masters Program will culminate in the production of a thesis ideally suitable for adaption as a scholarly publication in a peer-reviewed journal. The thesis should focus on assessment of an unanswered and important question on a relevant and approved subject, involve in-depth research and demonstrate critical thinking on the part of the student. A student in the Anatomical Sciences Track will meet with the Course Director during the spring semester of his/her first year in the program to begin to identify a research area and specific topic(s) for his/her thesis proposal. Areas of focus include (but are not limited to) the following: 1) Clinical Anatomy - anatomy related to medical procedures and/or training of health professionals; 2) Anatomical Variations - comparative research utilizing human cadavers in the gross anatomy laboratories or comparative research in animal models; 3) Anatomical Sciences Education - education research on anatomy teaching methods and approaches to teaching anatomy to health professions students;4) History of Anatomy - research on the development of human anatomical studies, comparative anatomy concepts, anatomy education, or involving other applications of the humanities to anatomical sciences (e.g. medical illustration, literature, music); 5) Human and rodent micro-anatomy /histology; or 6) Anatomical aspects of a biomedical research endeavor.

CSAT 6064. Genes & Development. 4 Credit Hours.
Genes and Development is the core course of the Genetics, Genomics, and Development Track. The course consists of four modules: genetics, genomics, developmental biology, and stem cell biology. Basic concepts in genetics such as cytogenetics, mitochondrial genetics, cancer genetics, linkage analysis, complex traits, population genetics, animal models, sex determination, and epigenetics will be presented. The genomics section will include historical aspects of the genome project and high throughput analysis. The students are introduced to new techniques in global analysis as well as have hands-on experience. The developmental biology section provides a survey of concepts in developmental biology (induction, cell-cell interactions, morphogen gradients, morphogenetic movements, transcriptional regulation, organogenesis) using experimental examples from both invertebrate and vertebrate embryos. The stem cell biology section includes the following topics: basic biology of stem cells, including embryonic stem cells, adult stem cells, stem cells in different tissues and model systems; microenvironment-mediated and epigenetic regulators of stem cells; stem cells in medicine, including regenerative medicine, cancer, and aging; and ethics. Required for the Genetics, Genomics & Development Track.

CSAT 6068. Cancer Biology Core 1: An Introductory Course. 1.5 Credit Hour.
This team-taught course will provide an introduction to molecular oncology with a focus on defining cancer and key molecular/cellular changes often associated with the development of cancer. The goal of the course is to provide the student with a solid background in general cancer biology. This course requires a strong background in basic cellular processes, such as those covered in IBMS 5007. These processes will be discussed with regard to how they are altered in cancer and whether such differences from normal biology offer a therapeutic opportunity to target cancer. Tumorigenesis is a multi-step process driven by genetic, epigenetic and metabolic/environmental changes that occur over time. Although cancer is a heterogeneous disease, many human tumors exhibit similar acquired physiological features. This course will cover the underlying molecular and cell biology mechanisms involved in carcinogenesis, tumor growth, and metastasis at a basic level. The implications of these biological findings on cancer prevention, diagnosis, and treatment will also be introduced. Upon completion of the class, students should have a general understanding of the mechanisms by which tumors gain and maintain a growth advantage as well as an initial handle on potential therapeutic targets. This course is meant to be the basic introduction/foundation for CSAT 6069, Cancer Biology Core 2; Advanced Cancer Biology. Open for Cross Enrollment on Space Available Basis.

CSAT 6069. Cancer Biology Core 2; Advanced Cancer Biology. 2.5 Credit Hours.
This course is designed to provide a detailed representation of cancer biology, from progression, standard of care and molecular alterations that drive recent diagnoses and therapeutic strategies. In addition, this course will offer an overview on special populations affected by cancers and models used in the investigation of cancer. Included are basic experimental methods, mouse models, ex vivo systems, molecular profiling and clinical trials. The conceptual notions on clinical trials of cancer drugs and the process of development of novel therapeutic drugs in cancer will be discussed. Required for Cancer Biology Discipline. Prerequisites: INTD 5007 (or INTD 6007 and INTD 6009) and CSAT 6068.

CSAT 6071. Supervised Teaching. 1-12 Credit Hours.
This course consists of participation in the teaching program of the first-year medical, dental, or health professions curriculum. Semester hours vary depending on the time spent in teaching.

CSAT 6072. Presentation Skills. 1 Credit Hour.
This course is designed to provide graduate students in the Cell Systems and Anatomy Master of Science degree program the opportunity to develop their skills in oral presentation. The course will focus on critical thinking, clear and concise presentation of research endeavors, and communicating science to the public, to students, and to other scientists. In the first (Fall) semester, each student will present a journal club presentation on a paper from the scientific literature and a practice for each students COGS Thesis Proposal presentation. In the second (Spring) semester, each student will present a research up-date and a scientific poster presentation. After each talk, all students and instructors will provide constructive suggestions aimed at improving the students presentation skills.

CSAT 6073. Selective Topics In Oncology: Gynecological Cancers. 2 Credit Hours.
This is an advanced elective course for the Cancer Biology Track. The course is a unique learning experience in preparing students in the emerging research areas of gynecological cancers for designing research experiments using preclinical and clinical research materials. The entire course is a small-group format in which student interact closely with a group of faculty who have active research or clinical programs focusing on molecular, clinical, and therapeutic areas of gynecological cancers.

CSAT 6074. Molecular Aspects Of Epigenetics. 2 Credit Hours.
The purpose of this course is to develop an understanding of the molecular aspects of epigenetics. This advanced course will be a unique learning experience that prepares the student to evaluate and design new research in the areas of epigenetic processes including imprinting, gene slicing, X chromosome inactivation, position effect, reprogramming, and the process of tumorigenesis. This module concerns epigenetic mechanisms. Topics include: DNA methylation, histone modifications, epigenetics and stem cells, cancer epigenetics, RNA interference and epigenetics, bioinformatics and epigenetics, and translational epigenetics. This course will include a didactic program and student discussion. For the student discussion module, faculty and students will 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.

CSAT 6076. Eucaryotic Molecular Biology. 2 Credit Hours.
This 8-week didactic course will not only introduce the student to the fundamentals of molecular biology but will familiarize the student with the modern molecular biology techniques used in research laboratories.

CSAT 6077. Eucaryotic Cell Biology. 2 Credit Hours.
This 8-week didactic course will introduce the student to the fundamentals of cell biology, familiarize the student with current techniques used to manipulate cells, describe the higher order integration of cells to tissues and thereby the development of multicellular organisms.

CSAT 6090. Seminar. 1-9 Credit Hours.
Attendance and participation in the regularly scheduled department seminar series is required each semester the course is offered. The activities included in the seminar course are attendance at invited seminars, journal club, and the student presentations including student annual progress and final dissertation and thesis presentations.

CSAT 6094. Advanced Neuroanatomy. 0.5 Credit Hours.
This course in neuroanatomy is offered to graduate students seeking to advance their knowledge beyond the fundamental level. The course consists of reading from more advanced texts and current anatomical literature as well as dissection of deep white matter tracts within the cortex. The student must also complete a 20-page paper on a neuroanatomical topic.

CSAT 6095. Analysis and Visualization of Genomic Data. 2 Credit Hours.
This course covers the basics of genomic data analysis and visualization. The focus is on general computational methods, their basis in biomedicine, and how to evaluate and visualize analysis results. Students are expected to be able to qualitatively describe the algorithms presented. Prerequisites: CSAT 5095 or Equivalent.

CSAT 6096. Research Rotations. 2 Credit Hours.
Laboratory rotations will acquaint students with the research pursued by faculty members in the CSA MS Program, and help identify research projects to fulfill their thesis requirements. In addition, laboratory rotations will allow students the opportunity to explore and assess their compatibility in the laboratory environments created by potential faculty mentors and their laboratory personnel. Conversely, faculty members serving as rotation advisors will have an opportunity to evaluate students wishing to complete their MS thesis research in their laboratories. The experience should give the students an understanding of future expectations, and exposure to new experimental strategies and methodologies that may prove useful in the students' eventual thesis research.

CSAT 6097. Research. 1-12 Credit Hours.
This course consists of independent, original research under the direction of a faculty advisor.

CSAT 6098. Thesis. 1-12 Credit Hours.
This course consists of instruction in the preparation of the thesis. Registration for at least one term is required of M.S. candidates. Admission to candidacy for Master of Science degree is required.

CSAT 6100. Anatomy Practicum. 2 Credit Hours.
This course is designed to provide students in the Cell Systems & Anatomy Masters Degree Program, Anatomical Sciences Track with a full-body dissection experience. This course teaches foundational hands-on application of anatomical concepts and three-dimensional relationships while allowing students to develop their necessary dissection skills through whole-body dissection. Students will gain teaching experience through presentations of anatomical structures and explanations of the procedural aspects of the dissections they complete. This course will enhance competency in anatomy and prepare students for serving as teaching assistants in other medical, dental, and health professions courses. Attributes of humanism and professionalism, including compassion and empathy, are integrated into the course along with those of knowledge and skill. Students must be concurrently enrolled in CSAT 5022 Interprofessional Human Gross Anatomy and must be officially enrolled in the Master's Degree Program, Anatomical Sciences Track, Department of Cell Systems & Anatomy. Course fees: Cadaver fee = $1069.64, Lab fee = $30.00, Tech Fee = $50.00.

CSAT 6165. Medical Genetics. 3 Credit Hours.
This course provides an introduction to the basic concepts of medical genetics and current areas of medical genetic research. The course reviews basic genetic concepts including the principles of Mendelian and nontraditional inheritance, cytogenetics, molecular genetics, quantitative and population genetics, and discuss important medical aspects of genetic counseling and pedigree analysis, dysmorphology, cancer genetics and counseling for inherited cancers, developmental genetics, prenatal diagnosis, newborn screening, and pharmacogenetics. Diagnosis and current research toward treatment and cure of common genetic disorders affecting metabolism, reproduction, the endocrine system, the functioning of the eye and the nervous system are discussed. An important aspect of the course will be a discussion of ethical issues in medical genetics. A basic background in genetics, cell biology, and biochemistry is assumed. Prerequisites: A basic background in genetics, cell biology, and biochemistry.

CSAT 7014. Gross Anatomy & Embryology I. 4.5 Credit Hours.
This course explores the anatomy of the human body following a regional approach. It begins with anatomical humanities ¿ the history, ethics, and art of human bodies to set the stage for the rest of the course. When studying regional anatomy, the adult anatomy is explained through learning its development. Common anatomical variants are incorporated to aid in structure identification. Content is integrated between regions with systemic principles throughout the course. Students can expect to develop skills in identifying anatomical structures using known relationships and applying those relationships to real-world case studies. Regions include: back, head and neck, thorax, abdomen, and pelvis. Cadaver fee=$843, Lab fee=$30.

CSAT 8010. Gross Anatomy & Embryology II. 1.5 Credit Hour.
This course explores the anatomy of the human body following a regional approach. When studying regional anatomy, the adult anatomy is explained through learning its development. Common anatomical variants are incorporated to aid in structure identification. Content is integrated between regions with systemic principles throughout the course. Students can expect to develop skills in identifying anatomical structures using known relationships and applying those relationships to case studies. The course builds on Gross Anatomy and Embryology I, and some topics will be reviewed as relevant to this course. Regions include the upper and lower limbs. Course fees: Lab fee $30.