ANATOMY (ANAT)

ANAT 301. Multimodal Human Anatomy. 4 Units.
This course introduces students to the gross anatomical structure of the human body using cadaver prosection and digital 3D technology, including the innovative Microsoft HoloLens. It differs from most traditional anatomy courses (including ANAT 411) not only in its use of three-dimensional imaging technologies, but also in its systemic rather than regional approach; the structure of the human body is learned by studying organ systems (e.g., the nervous system, the muscular system) rather than focusing on one region at a time (e.g., the thorax or the lower limb). This approach gives students the "big picture" of how the human body is organized, thereby providing a solid foundation for other courses that deal with the anatomy of the human body in greater detail. Cadaver demonstrations allow students to see anatomical systems in context and apply knowledge learned through virtual technologies. Offered as ANAT 301 and ANAT 401.

ANAT 302. Human Musculoskeletal Anatomy. 4 Units.
This course provides an in-depth review of the structure and function of the human musculoskeletal system through lectures and cadaver-based dissections. Topics will include a review of the connective tissues, basic biomechanics, osteology and regional and functional anatomy of the back and spine, lower limb, and upper limb. This course will be useful for students interested in pursuing study in the areas of medicine, anatomy, bioengineering, sports medicine, orthopaedics, biological anthropology or organismal biology. Offered as ANAT 302 and ANAT 402. Prereq: Junior or Senior student status.

ANAT 303. Methods Neuroscience Research. 4 Units.
This course will provide students the knowledge necessary to choose the appropriate methods needed to explore scientific questions, understand ethical research design, use safe laboratory practices and develop research skills that are highly valuable in the field of neuroscience. The topics covered in this course include basic laboratory skills, neuroanatomy, histology, neurophysiology and behavioral neuroscience. Successful completion of this course will equip students with the kinds of practical knowledge and hands-on experiences that can enhance competitiveness for internships, doctoral training programs or careers in research laboratories. Offered as ANAT 303, ANAT 403, NEUR 303, and NEUR 403.

ANAT 312. Medical Histology. 4 Units.
This course covers basic to advanced concepts in histology, a discipline which examines the structure and correlating functions of tissues and cells. The aim of this course is to provide a sound understanding of the basic tissues and how they organize and integrate to form the major organ systems that comprise the human body. While the course's emphasis will be the study of the normal presentation of cells, tissues and organs, abnormal/altered tissues and clinical correlations will be part of the content, in order to establish a meaningful connection with the subject. Prereq: BIOL 215.

ANAT 345. Mammal Diversity and Evolution. 4 Units.
This course focuses on the anatomical and taxonomic diversity of mammals in an evolutionary context. The emphasis is on living (extant) mammals, but extinct mammals are also discussed. By the end of the course, students will be able to: (1) describe the key anatomical and physiological features of mammals; (2) name all orders and most families of living mammals; (3) identify a mammal skull to order and family; (4) understand how to create and interpret a phylogenetic tree; (5) appreciate major historical patterns in mammal diversity and biogeography as revealed by the fossil record; (6) read and critique a scientific article dealing with mammal evolution. This course satisfies a laboratory requirement for the biology major. Recommended preparation: ANAT 301, BIOL 223, BIOL 225, or BIOL 346. Offered as ANAT 345, ANAT 445 and BIOL 345. Prereq: BIOL 214.

ANAT 391. Embryology. 3 Units.
A detailed description of development will be presented, focusing mainly on the developing human. Discussions and presentations will also include several developing systems that have served as useful models in experimental embryology for deciphering mechanisms responsible for producing adult metazoan organisms. Offered as ANAT 391 and ANAT 491.

ANAT 399. Independent Study. 1 - 4 Units.
Laboratory research project. Student must obtain approval of a supervising Anatomy department professor before registration and list the professor's name on the schedule card.

ANAT 401. Multimodal Human Anatomy. 4 Units.
This course introduces students to the gross anatomical structure of the human body using cadaver prosection and digital 3D technology, including the innovative Microsoft HoloLens. It differs from most traditional anatomy courses (including ANAT 411) not only in its use of three-dimensional imaging technologies, but also in its systemic rather than regional approach; the structure of the human body is learned by studying organ systems (e.g., the nervous system, the muscular system) rather than focusing on one region at a time (e.g., the thorax or the lower limb). This approach gives students the "big picture" of how the human body is organized, thereby providing a solid foundation for other courses that deal with the anatomy of the human body in greater detail. Cadaver demonstrations allow students to see anatomical systems in context and apply knowledge learned through virtual technologies. Offered as ANAT 301 and ANAT 401.

ANAT 402. Human Musculoskeletal Anatomy. 4 Units.
This course provides an in-depth review of the structure and function of the human musculoskeletal system through lectures and cadaver-based dissections. Topics will include a review of the connective tissues, basic biomechanics, osteology and regional and functional anatomy of the back and spine, lower limb, and upper limb. This course will be useful for students interested in pursuing study in the areas of medicine, anatomy, bioengineering, sports medicine, orthopaedics, biological anthropology or organismal biology. Offered as ANAT 302 and ANAT 402.

ANAT 403. Methods Neuroscience Research. 4 Units.
This course will provide students the knowledge necessary to choose the appropriate methods needed to explore scientific questions, understand ethical research design, use safe laboratory practices and develop research skills that are highly valuable in the field of neuroscience. The topics covered in this course include basic laboratory skills, neuroanatomy, histology, neurophysiology and behavioral neuroscience. Successful completion of this course will equip students with the kinds of practical knowledge and hands-on experiences that can enhance competitiveness for internships, doctoral training programs or careers in research laboratories. Offered as ANAT 303, ANAT 403, NEUR 303, and NEUR 403.

ANAT 410. Cadaver Dissection-based Human Anatomy with Histology and Physiologic Correlations. 6 Units.
This course will provide students with a sound understanding of the normal human body as a foundation for subsequent pursuing biomedical careers. The gross anatomy component will give a full breakdown of all gross aspects of the human body and the associated systems, while also including cadaver dissection-based laboratories. The histology component will provide students with an understanding of the structural and functional organization of the human body at the cellular and subcellular levels. The embryology component will briefly discuss the major systems and how they form within a developing embryo. This course is well-suited to all biomedical careers, including pre-clinical and biomedical undergraduates, post-baccalaureate, pre-clinical master of science graduate programs, plus medical and dental students seeking additional training in the anatomical sciences. It will meet any of the anatomy-oriented prerequisites being implemented for medical and dental school applications, including those preferring or requiring a cadaver-based experience. The assessments will include a combination of written and cadaver-based practical questions. Offered as ANAT 410 and PAST 410.

ANAT 411. Gross Anatomy. 6 Units.
This in-depth, regionally-oriented, cadaver dissection-based course covers all aspects of human gross anatomy. It is team-taught by Department of Anatomy faculty and is divided into six sections: thorax, abdomen, pelvis and perineum, upper limb and back, lower limb, and head and neck. Registration for both the lecture and lab components is required. Students should be prepared to devote additional time outside of class in order to master the material. The dissection lab is open 24 hours, 7 days a week to students registered for the course. Recommended preparation: introductory coursework in human anatomy or B.A./B.S. in Biology or related field.

ANAT 412. Histology and Ultrastructure. 4 Units.
Comprehensive functional histology course integrating microscopic identification ('structure plus nomenclature') of normal cells, tissues, and organs with aspects of their cell biology, biochemistry, and physiology ('function'). Topical coverage includes complete ('head-to-toe') tissue and organ survey with human emphasis. Offered as ANAT 412 and PATH 412.

ANAT 414. Neurological Anatomy. 4 Units.
This course employs a variety of teaching-learning methods--among them lectures, small-group discussions, hands-on "construction" of pathways, and brain dissection. Regional morphology will be studied via examination of the preserved brain and of sections through the CNS; functional systems will be "followed" through the spinal cord, brain stem and/or forebrain.

ANAT 445. Mammal Diversity and Evolution. 4 Units.
This course focuses on the anatomical and taxonomic diversity of mammals in an evolutionary context. The emphasis is on living (extant) mammals, but extinct mammals are also discussed. By the end of the course, students will be able to: (1) describe the key anatomical and physiological features of mammals; (2) name all orders and most families of living mammals; (3) identify a mammal skull to order and family; (4) understand how to create and interpret a phylogenetic tree; (5) appreciate major historical patterns in mammal diversity and biogeography as revealed by the fossil record; (6) read and critique a scientific article dealing with mammal evolution. This course satisfies a laboratory requirement for the biology major. Recommended preparation: ANAT 301, BIOL 223, BIOL 225, or BIOL 346. Offered as ANAT 345, ANAT 445 and BIOL 345. Prereq: BIOL 214.

ANAT 462. Principles of Developmental Biology. 3 Units.
The descriptive and experimental aspects of animal development. Gametogenesis, fertilization, cleavage, morphogenesis, induction, differentiation, organogenesis, growth, and regeneration. Students taking the graduate-level course will prepare an NIH-format research proposal as the required term paper. Offered as BIOL 362, BIOL 462 and ANAT 462. Prereq: Graduate student standing.

ANAT 467. Topics in Evolutionary Biology. 3 Units.
The focus for this course on a special topic of interest in evolutionary biology will vary from one offering to the next. Examples of possible topics include theories of speciation, the evolution of language, the evolution of sex, evolution and biodiversity, molecular evolution. The graduate level offerings of this course will require a longer, more sophisticated term paper, and additional class presentation. Offered as ANTH 367, BIOL 368, EEPS 367, PHIL 367, ANAT 467, ANTH 467, BIOL 468, EEPS 467, PHIL 467 and PHOL 467.

ANAT 491. Embryology. 3 Units.
A detailed description of development will be presented, focusing mainly on the developing human. Discussions and presentations will also include several developing systems that have served as useful models in experimental embryology for deciphering mechanisms responsible for producing adult metazoan organisms. Offered as ANAT 391 and ANAT 491.

ANAT 499. Independent Study. 1 - 4 Units.
Laboratory research project. Student must obtain approval of a supervising Anatomy department professor before registration and list the professor's name on the schedule card.

ANAT 503. Readings and Discussions. 1 - 3 Units.
In-depth consideration of special selected topics through critical evaluation of the literature. Student must obtain approval of supervising Anatomy department professor before registration.

ANAT 510. Anatomical Principles Surgery. 3 Units.
In this team-taught course, students learn how anatomic relationships and considerations affect surgical decision making. It meets once per week during the eight-week summer session. The first week introduces students to surgical tools, techniques, and sterility; subsequent weeks focus on different surgical specialities, including general, vascular, neurological, urological, orthopedic, and head and neck (otolaryngology). Students build on their pre-existing knowledge of human anatomy and learn through a combination of framing lectures and cadaveric surgical simulations directed by clinical surgical faculty. Prereq: ANAT 401 or ANAT 411 or MD Student.

ANAT 515. Surgical Anatomy: Orthopaedic Musculoskeletal. 4 Units.
This orthopaedic musculoskeletal anatomy course is offered to M.S. in Applied Anatomy students and fourth year medical students. The course will familiarize participants with surgical approaches used to treat musculoskeletal disease. Students will learn to correlate normal and abnormal anatomical findings with radiographical studies. Recommended preparation: ANAT 411.

ANAT 516. Surgical Anatomy: Head and Neck. 4 Units.
This cadaver-based advanced anatomy course is offered to M.S. in Applied Anatomy students and fourth-year medical students. Students will build on their understanding of basic gross, histological, pathologic, and embryonic anatomy of the head and neck. The course will familiarize participants with surgical approaches used to treat pathological conditions of the head and neck including cranial cavity, cranial base, orbit, maxillofacial, oral, otic, pharyngeal, and airway. Students are required to attend and participate in lectures, surgical labs, and discussions in order to successfully complete the course. Prereq: ANAT 411 or Doctor of Medicine (MD) student.

ANAT 520. Imaging Anatomy. 3 Units.
This course is constructed to reinforce normal anatomy by imaging modalities of plain film, CT, and MRI images. Imaging anatomy will reinforce the student's knowledge of anatomy and introduce the field of radiology. Students would be motivated to broaden their understanding of anatomy by being exposed to the application of that knowledge. The curriculum would introduce radiologic concepts, while stressing the normal anatomy of organ systems by imaging modalities. Anatomical structures will be recognized by projectional and cross-sectional modalities. The student will be expected to demonstrate the anatomical characteristics of that structure, for example course, area of supply, relations, morphology, etc. Primarily for medical and graduate students who have a comprehensive knowledge of human anatomy. We would encourage having taken ANAT 411, Gross Anatomy or Structure.

ANAT 523. Histopathology of Organ Systems. 3 Units.
Comprehensive course covering the underlying basic mechanisms of injury and cell death, inflammation, immunity, infection, and neoplasia followed by pathology of specific organ systems. Material will include histological ('structure') and physiological ('function') aspects related to pathology (human emphasis). Recommended preparation: ANAT 412 or permission of instructor. Offered as ANAT 523 and PATH 523.

ANAT 560. Applied Neuroanatomy. 3 Units.
This course is constructed to reinforce the student's understanding of neuroanatomy. Through problem-based learning the student will set their own learning objectives based on a neurosurgical case. Presentations will use imaging, anatomic diagrams, and cadaveric dissection to demonstrate applications. Learning in this clinical context will increase motivation and understanding of this important subject. Primarily for medical students and graduate students, enrollment is by permission of instructor and completing ANAT 414, Neurological Anatomy. Prereq: ANAT 414.

ANAT 610. Oxygen and Physiological Function. 1 Unit.
Lecture/discussion course which explores the significance and consequences of oxygen and oxygen metabolism in living organisms. Topics to be covered include oxygen transport by blood tissues, oxygen toxicity, and mitochondrial metabolism. Emphasis will be placed on mammalian physiology with special reference to brain oxidative metabolism and blood flow as well as whole body energy expenditure and oxidative stress related to disease. The course will cover additional spans of physiology, nutrition and anatomy. Offered as ANAT 610, NTRN 610, and PHOL 610.

ANAT 611. Practicum in Human Gross Anatomy. 3 Units.
A course of study designed especially for the preparation of teachers that involves the supervised practical application of previously studied theory. The teaching experience obtained will be obtained in ANAT 411 - Human Gross Anatomy. Teaching will be guided, supervised, and evaluated by the appropriate faculty from the department of anatomy. The three sections of ANAT 611 and the subjects covered are: Trunk Gross Anatomy (6 weeks), Musculoskeletal Gross Anatomy (3 weeks), Head & Neck Gross Anatomy (4 weeks). Required preparation: ANAT 411 and permission of instructor.

ANAT 651. Thesis M.S.. 1 - 9 Units.
Master's Thesis Plan A.