

MODERN HUMAN ANATOMY (MS)

Overview

The Master of Science Program in Modern Human Anatomy (MHA) provides graduate level training and teaching experience in the physical and virtual anatomical sciences. The curriculum integrates 3D computer imaging and modeling with human cadaver dissection, neuroanatomy, histology, and embryology.

The Master of Science in Modern Human Anatomy (MHA) Program is innovative and unique, bridging an established anatomy/developmental biology curriculum with the foundations of digital imaging technologies now in use in medical care, biomedical research, medical illustration, and teaching. This program blends modern and classical approaches to anatomical study, with a goal of producing a new generation of anatomical professionals prepared for diverse careers. The program emphasizes an individualized, flexible approach to professional growth and career development through a student-designed capstone project.

This two-year program will prepare graduates to work in a broad spectrum of educational and biomedical sub-specialties where creativity and innovation abound, and knowledge of human anatomy is highly valued.

Anatomical Imaging & Modeling track

The latest advancements in medical imaging technology have accelerated the acquisition of high-resolution, 3D anatomical data. Tools such as 3D printers, surface scanners, and virtual/augmented reality headsets have propelled the creation and use of 3D graphics in the research and education of the anatomical sciences. These developments have created a demand for individuals with strong spatial skills, proficient in both human anatomy and in 3D technology. The Anatomical Imaging and Modeling (AIM) track aims to weave traditional teachings in anatomical sciences with cutting-edge, 3D technology through AIM specific coursework, mentorship, project-based learning, and teaching opportunities.

Admissions Requirements

To apply for admission applicants must submit the following:

- Online Graduate School application
 - Statement of Purpose: describe plans for graduate study, potential career choices, how the MHA will help reach goals, and comfort with technology.
 - Resume or CV
 - Past Work: describe aspects of background that will lead to success in this rigorous graduate program, describe past academic and non-academic educational experiences.
 - Three letters of recommendation
 - Test scores (recommended, not required): GRE, MCAT, and DAT accepted
- Application Fee: A nonrefundable application fee of \$50.00 (U.S. dollars) for domestic applicants and \$75.00 (U.S. dollars) for international applicants. Checks or money orders should be made out to the University of Colorado.
- Interview: After the application is complete, qualifying applicants are invited to participate in one of the MHA interview days. The applicant may choose an in-person or video interview, which will be arranged

with the applicant and one faculty member plus a current 2nd year MHA student. The in-person interview days provide applicants with opportunities to learn more about the MHA program, speak directly with current students and faculty, meet other applicants, and participate in a Curriculum Overview and student-run Q&A session.

To be considered for admission, applicants must participate in the interview process.

- Transcripts: One official transcript from all post-secondary colleges and/or universities should be submitted.

Electronic Transcripts should be sent to: graduate.school@cuanschutz.edu

If sending a physical transcript, please mail to:

University of Colorado Anschutz Medical Campus Graduate School
Mail Stop C296
Fitzsimons Building, C5000
13001 E. 17th Place
Aurora, CO 80045

International students must meet ALL of the requirements above and those required by International Admissions.

Degree Requirements

Please note: Year 1 Summer, Year 2 Fall, and Year 2 Spring are flexible, and courses can be taken in many orders and combinations.

First Year

Year 1		
Fall		Hours
ANAT 6205	Imaging and Modeling	4
ANAT 6310	Neuroanatomy	4
ANAT 6412	Foundations of Teaching	1
ANAT 6321	Human Histology	4
Hours		13
Spring		
ANAT 6111	Human Gross Anatomy	8
ANAT 6330	Human Embryology	3
Hours		11
Summer		
ANAT 6600	Experimental Design and Research Methods	1
ANAT 6950	MSMHA Capstone Project	1-12
Hours		2-13
Total Hours		26-37

Second Year

Year 2		
Fall		Hours
ANAT 6910	Teaching Practicum	1-4
Elective (3 Credits)		
ANAT 6950	MSMHA Capstone Project	1-12
Hours		2-16
Spring		
Elective		3
Elective		3

ANAT 6950	MSMHA Capstone Project	1-12
Hours		7-18
Total Hours		9-34

Anatomical Imaging & Modeling Required Courses

Code	Title	Hours
ANAT 6208	Foundations in 3D Modeling for Anatomical Sciences	1
ANAT 6210	Autodesk Maya for Anatomical Science	2
ANAT 6220	Unreal Engine for the Anatomical Sciences	2
<i>Electives</i>		4

MHA Pathway to Dentistry

The MHA Pathway to Dentistry track provides academic and professional preparation and a pathway to the University of Colorado School of Dental Medicine's (SDM) Doctor of Dental Surgery (DDS) program through the M.S. in Modern Human Anatomy. Students admitted to the MHA Pathway to Dentistry track will complete the first-year curriculum of the Modern Human Anatomy program, begin work on the MHA Capstone Project, then transition into the Doctor of Dental Surgery curriculum in the Fall of their 2nd year. Students admitted to the Pathway Program will receive a reserved seat in the DDS program. While completing the 4-year Doctor in Dental Surgery requirements, the students will complete the MHA Capstone Project and Teaching Practicum, to graduate with both the M.S. and the D.D.S. degrees. The goal of the MHA Pathway to Dentistry track is to increase workforce diversity in dental medicine and provide clarity and support in the pathway to pursuing dental medicine as a career.

Year 1		Hours
Fall		
ANAT 6205	Imaging and Modeling	4
ANAT 6310	Neuroanatomy	4
ANAT 6321	Human Histology	4
ANAT 6412	Foundations of Teaching	1
Hours		13
Spring		
ANAT 6111	Human Gross Anatomy	8
ANAT 6330	Human Embryology	3
Hours		11
Summer		
ANAT 6950	MSMHA Capstone Project	1-3
ANAT 6600	Experimental Design and Research Methods	1
Hours		2-4
Year 2 (or later)		
ANAT 6910	Teaching Practicum	1
ANAT 6950	MSMHA Capstone Project	1-8
Electives in School of Dental Medicine		9
Hours		11-18
Total Hours		37-46

Learning Objectives

The Master of Science in Modern Human Anatomy program trains graduate students to be capable and skilled scholars who are successfully able to:

1) Demonstrate a broad knowledge of human anatomy

- Develop an in-depth and thorough understanding of human anatomy at the macroscopic level, including systems-based and regional anatomy.
- Develop an understanding of neural systems organization, cellular neurobiology, and topographic and vascular anatomy of the spinal cord, brain, and cerebrum.
- Develop a microscopic-level comprehension of human tissue, including the structure, function, and organization of cells and tissues.
- Evaluate and assess the developmental process of human embryonic and fetal periods, analyze congenital abnormalities, and integrate embryology to adult human gross anatomy.

2) Understand and apply multiple imaging and modeling modalities

- Synthesize image characteristics, informatics, acquisition, processing, and analysis with an emphasis on 3D and dynamic data.
- Create and implement 3D anatomical models.

3) Teach anatomical sciences at a professional level

- Develop content-based instructional and pedagogical skills, understand frameworks for making curricular decisions, implement active learning techniques and investigate the impact of teaching for diversity in health science programs.
- Apply pedagogical theories to practice in a professional program.

4) Complete a novel work or project that contributes to field of anatomical sciences

- Select a project or pursue an area of research that includes the investigation of one or more sub-disciplines in anatomical sciences, including areas such as: anatomical education, educational technology, clinical applications, and imaging and modeling.
- Demonstrate scientific literacy by critically evaluating your work in the context of published literature.
- Develop aims and establish a methodology for achieving the desired outcomes.
- Present the project publicly.
- Submit a final paper, outlining the project aims, methodology, and outcomes.

5) Develop an emphasis area within anatomy, anatomy education, and/or imaging and modeling

Courses

ANAT 6111 - Human Gross Anatomy (8 Credits)

The Human Gross Anatomy course examines the form and function of the human body at a macroscopic level. Systems-based and regional anatomy lectures are complemented by full-body cadaver dissection. Medical imaging labs provide the opportunity to learn ultrasound skills. Requirements: Must be a degree-seeking student in MS Modern Human Anatomy program.
Grading Basis: Letter Grade
Typically Offered: Spring.

ANAT 6205 - Imaging and Modeling (4 Credits)

This course covers major medical and scientific imaging modalities with an emphasis on 3D scientific and medical visualization. Students will also receive instruction in advanced digital image processing and 3D modeling using industry-standard software such as MATLAB and Maya. Prerequisite: Only ANAT degree-seeking students
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall.

ANAT 6208 - Foundations in 3D Modeling for Anatomical Sciences (1 Credit)

An introduction to the applications and techniques necessary for 3D scanning, modeling, and printing. This lab-based course will provide students with hands-on experience on acquiring and processing surface scan data along with strategies for printing and finishing objects using fused-deposition modeling and stereo lithography. Pre-requisite: ANAT 6205
Grading Basis: Letter Grade
Typically Offered: Fall, Spring, Summer.

ANAT 6210 - Autodesk Maya for Anatomical Science (2 Credits)

Autodesk Maya for Anatomical Sciences teaches students to create professional animations illustrating concepts inherent in the study of medical science using Autodesk Maya. Pre-requisite: ANAT 6208.
Grading Basis: Letter Grade
Typically Offered: Fall, Summer.

ANAT 6220 - Unreal Engine for the Anatomical Sciences (2 Credits)

This course builds upon the foundational 3D modeling skills learned in ANAT 6260 and provides students with the practical experience, inspiration, and confidence to incorporate the Unreal Engine into their capstone. Students will deploy an app built with Unreal Engine. Pre-requisite: ANAT 6208 Prerequisite; ANAT-MS student or instructor permission.
Grading Basis: Letter Grade
Typically Offered: Fall, Spring, Summer.

ANAT 6310 - Neuroanatomy (4 Credits)

Structure & Function in the Human Nervous System. Basic neuroanatomy & neural systems with workshop focus employing facilitated discussions & problem-oriented cases. Laboratory sessions will employ brain specimens, models & image sets. Team-based projects are in-depth exploration of topics with development of collaborative presentations. Requisite: Restricted to ANAT students only.
Grading Basis: Letter Grade
Typically Offered: Fall.

ANAT 6321 - Human Histology (4 Credits)

Histology is the study of the tissues. By exploring the human structure, function and organization at the histological level, students will gain important pattern recognition skills to integrate microscopic knowledge with macroscopic gross anatomy and other foundational anatomical sciences. (Will replace ANAT 6320) Prereq: Restricted to ANAT students only.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall.

ANAT 6330 - Human Embryology (3 Credits)

This graduate level, introductory human embryology course will emphasize developmental aspects of adult anatomy and congenital malformations. Educational value of three-or-four-dimensional models and other ancillary learning resources for human embryology will also be explored. Requisite: Restricted to ANAT students only.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Spring.

ANAT 6412 - Foundations of Teaching (1 Credit)

This course will provide students with training, practice, and constructive feedback in effective teaching skills in order to be successful in the biomedical professions. Topics include learning objectives, the neurobiology of learning, assessments, and effective communication within and outside the classroom.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall.

ANAT 6490 - Advanced Teaching in Anatomical Sciences (3 Credits)

This course offers a hands-on, supervised experience as an anatomical sciences educator. Readings and discussions will enhance your understanding of educational pedagogy. You will apply these skills as you develop and deliver lecture and lab content in a classroom setting. Instructor consent required.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Spring.

ANAT 6600 - Experimental Design and Research Methods (1 Credit)

In this course, students will foster and apply strategies that enable critical evaluation of any published research (including basic, clinical, and educational), as well as develop the skills necessary to conduct and appropriately analyze their own research data.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Summer.

ANAT 6750 - Special Topics: Modern Human Anatomy (1-6 Credits)

This course is offered in a variety of technical and thematic areas in modern human anatomy. The specific topics vary from year to year. Note: This course includes lectures, discussions and workshops.
Grading Basis: Letter Grade
Repeatable. Max Credits: 6.
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Spring, Summer.

ANAT 6840 - Independent Study (1-6 Credits)

This course enables the student to pursue an investigation in a modern human anatomical field of choice toward completion of a capstone project with relatively minor supervision from faculty advisors.

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

ANAT 6910 - Teaching Practicum (1-4 Credits)

Hands-on teaching course in which students apply pedagogical theories to practice in a professional program as a teaching assistant, lecturer or other instructional position. Prereq.: ANAT 6412. Course restricted to ANAT majors.

Grading Basis: Satisfactory/Unsatisfactory

Repeatable. Max Credits: 4.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

ANAT 6911 - Advanced Teaching Practicum (1-4 Credits)

Hands-on teaching course in which students apply pedagogical theories to practice in a professional program as a teaching assistant, lecturer or other instructional position. Pre-requisite: ANAT degree-seeking student; ANAT 6412

Grading Basis: Letter Grade

Repeatable. Max Credits: 4.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

ANAT 6931 - MSMHA Internship (1-6 Credits)

The internship provides hands-on learning opportunities and practical experience for graduate students in institutions related to anatomical sciences, imaging, technology/biotechnology, innovation, and entrepreneurship. Restricted to ANAT students only

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

Typically Offered: Fall, Spring, Summer.

ANAT 6950 - MSMHA Capstone Project (1-12 Credits)

The Capstone project is a scholarly and/or research-based pursuit of knowledge and content development in the area of anatomical sciences, modern imaging and modeling technologies, and educational science completed as part of the MS in Modern Human Anatomy. Prerequisite: Must be ANAT degree-seeking student.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 12.

Additional Information: Report as Full Time.

Typically Offered: Fall, Spring, Summer.

303-724-7461

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Policies

Please refer to the Graduate School Policies page (<http://catalog.ucdenver.edu/cu-anschutz/schools-colleges-programs/graduate-school/#policies>).

Contact Us

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