

DUAL DEGREE PROGRAMS

Dual Degree Programs with the MD

The degree programs listed in this section may require admission to another school at the university in addition to or instead of the School of Medicine. Each school may have different deadlines and requirements for admissions. Please contact the other schools separately using information provided under that school's listing in this publication. Additional dual degree programs not including the MD are also offered through the medical school's departments. Several certificate programs (<http://bulletin.case.edu/schoolofmedicine/generalmedicalsciences/#globalhealthcertificatetext>) are also offered in General Medical Sciences (<http://bulletin.case.edu/schoolofmedicine/generalmedicalsciences/>).

MD/PhD (MSTP)

The Medical Scientist Training Program (p. 2) leads to the MD/PhD in various biomedical programs. Additional admissions information can be obtained here (<https://case.edu/medicine/admissions-programs/md-phd-program/prospective-students/mstp-admissions/>).

Doctor of Medicine- MD/JD

The School of Law and the School of Medicine offer a specialized dual degree program that allows a student to complete both degrees in six years. Law students enrolled in the dual JD/MD degree program may earn up to 12 credits toward the JD in graduate level MD courses. A student who begins at the law school spends two years studying law, then four years studying medicine. Alternatively, a student may spend the first two years and the last two years at the medical school, and the two middle years at the law school. For more information about the JD portion of the program, call the law school admissions office at 216.368.3600 or 800.756.0036, or e-mail lawadmissions@case.edu ([//lawadmissions@case.edu](mailto:lawadmissions@case.edu)).

Master of Arts in Anthropology- MD/MA

This dual degree program is an organized course of study for students with a range of medical anthropological interests. The program is designed for students who wish to pursue anthropology beyond the baccalaureate level and to become acquainted with professional work in anthropology and to meet the challenges of our increasingly globalized world. The MA in Anthropology requires 30 credit hours of courses that may be taken as a dedicated year of study or taken across several years of study. For more information about the MA requirements, visit the Department of (<https://anthropology.case.edu/>) Anthropology website, call 216.368.3703, or email the department at anthropology@case.edu.

Master of Arts in Bioethics- MD/MA

The 27-credit-hour Master's degree program, including a 12-hour foundations course taken during the first year of medical school, provides advanced training in bioethics while emphasizing the interdisciplinary and interprofessional nature of the field. In this program, medical students will participate in and contribute to the critical analysis of moral issues related to health, health care, and health policy at local, national and international levels. Medical school students complete the bioethics program while pursuing their medical degrees; no additional time is required. Admission for the master's degree portion is through the Case Western Reserve University School of Graduate Studies. For

more information about the MA requirements, visit the Bioethics section (<http://bulletin.case.edu/schoolofmedicine/bioethics/#graduatetext>) or e-mail bioethics@case.edu ([//bioethics@case.edu](mailto:bioethics@case.edu)).

Master of Public Health- MD/MPH

Graduates of this 5-year, 42-hour master's degree program are qualified to work in local and state health departments, universities and colleges, hospitals, ambulatory medical centers, non-profit organizations and the insurance and pharmaceutical industries. Areas of concentration include health promotion and disease prevention, population health research, health policy and management, global health, and health informatics. For more information about the MPH requirements, visit the Master of Public Health website (<https://epbiwww.case.edu/dual-degree-programs/>) or email mph-info@case.edu (mph-info@case.edu).

Master of Science in Applied Anatomy- MD/MS

Students seeking advanced training in the anatomical sciences may begin the 30-hour master's degree program in the fall or spring semester of the first year of medical school. Required graduate courses include the anatomical sciences core curriculum, completed during the first two years of medical school, and an advanced surgical anatomy course taken in the fourth year. Students earn the remaining credits through elective courses. Completion of a thesis is not required, but students may undertake independent research experiences as electives; a thesis-based program also is available. Interested medical students must apply to the master's program through the Department of Anatomy. For more information about the MS requirements, visit the Master of Science in Applied Anatomy website (<https://case.edu/medicine/anatomy/curriculum/>), call 216.368.2433, or email anatomy@case.edu.

Master of Science in Biomedical Engineering- MD/MS

Medicine is undergoing a transformation based on the rapid advances in science and technology that are combining to produce more accurate diagnoses, more effective treatments with fewer side effects, and improved ability to prevent disease. The goal of the MD/MS in Engineering is to prepare medical graduates to be leaders in the development and clinical deployment of this technology and to partner with others in technology based translational research teams. Current CWRU medical students in either the University Program (UP) or the Cleveland Clinic Lerner College of Medicine (CCLCM) may apply to the MD/MS in Engineering program. Students should apply through the BME department admissions office. For more information about the MS requirements, visit the Biomedical Engineering website (<http://engineering.case.edu/ebme/>) or email bmedept@case.edu.

Master of Science in Biomedical Investigation- MD/MS

This program is for medical students who would like extra time to participate in bench research and to add to their background in biochemistry. The dual degree program double counts some classes from the medical school curriculum (as is done in the MSTP program) so that only 9 additional hours of formal classwork needs to be accomplished for the MS. One full year is devoted to research with tuition and health fees paid by the department. Additionally, a stipend of \$15,000 is provided for the student from the advisor's research grant. Thus, there should be no

cost to the student for this additional year. For more information contact Dr. Martin Snider (martin.snider@case.edu).

Master of Business Administration- MD/ MBA

There is a growing need for physicians with business skills to manage organizations such as corporate practices, hospitals, etc. Those who complete this 5-year program will be able to apply learned management principles and take leadership roles as they navigate through varying and increasingly complex healthcare environments. For more information about the MBA requirements, visit the Weatherhead School of Management website (<https://weatherhead.case.edu/degrees/masters/dual-degree/md-mba/>), call 216.368.3450, or email casemed-admissions@case.edu.

Medical Scientist Training Program (MSTP)

A combined MD/PhD program in biomedical sciences, the Medical Scientist Training Program (MSTP) is available for students desiring research careers in medicine and related biosciences. This program takes seven to eight years to complete, depending on the time needed to complete the PhD dissertation research. Financial support includes a stipend and full tuition support.

Candidates must meet established prerequisites for admission to both the School of Medicine and the School of Graduate Studies. Criteria include demonstrated capabilities in research and superior undergraduate academic credentials. Applicants must have either U.S. citizenship or permanent residency status to be considered for admission to the MSTP. Information can be obtained by contacting the MSTP program (mstp@case.edu) or from the program website (<http://mstp.case.edu>). Admissions are coordinated via the School of Medicine admissions program and the AMCAS application.

The first two years of the MSTP are centered on the University Program pre-clinical core medical school curriculum, which occupies five mornings each week. Afternoons include time for graduate courses and/or research rotations, as well as clinical training, thus integrating the medical school and graduate school experiences. The next three to four years are devoted to completion of graduate courses and PhD thesis research in one of the multiple MSTP-affiliated graduate programs. During the PhD phase, MSTP students participate in the MSTP Clinical Tutorial, a program designed to enhance clinical skills and allow students to develop connections between their research and clinical interests (this further addresses the goal of integrating medicine and science). After completion of the PhD program, students return to medical school for two years to complete clinical clerkships and finish the MD curriculum.

The program is administered by the MSTP Steering Committee, which consists of faculty from both basic science and clinical departments. Its functions include selecting candidates for admission, designing and administering the program curriculum, advising students and evaluating student progress.

Please see the Doctor of Medicine (MD) (<http://bulletin.case.edu/schoolofmedicine/md/>) page for information about the MD curriculum.

MSTP Program by Year

Year 1

- University Program MD curriculum
- Summer Intro to MSTP course
- One graduate course or research rotation each semester (fall and spring)

Year 2

- University Program MD curriculum
- Summer research rotations (1 or 2)
- Graduate course or research rotation in the fall semester

Year 3

- PhD program

Year 4

- PhD program
- MSTP Clinical Tutorial

Year 5

- PhD program
- Optional MSTP Clinical Tutorial

Year 6 (If Needed)

- PhD program
- Optional MSTP Clinical Tutorial
- All PhD work, including dissertation defense and publications, to be completed before starting the 3rd year MD curriculum

Year 7

- Third year MD curriculum (core clinical clerkships)

Year 8

- Fourth year MD curriculum (completion of core clinical clerkships if necessary, clinical and research electives)

General Description

The Case Western Reserve University Medical Scientist Training Program (MSTP) provides training for future physician-scientists by integrating well-developed curricula in science and medicine. Unique aspects of the program include the integration of graduate school and medical school in many phases of the program to optimize dual-degree training and a high degree of student involvement in running the program.

The MSTP includes three major phases of training.

First phase: During the first two years, each student completes the first two years of the University Program medical school curriculum, including early clinical experiences, completes at least three research rotations, takes graduate courses, and chooses his or her PhD graduate program and thesis lab. During the summer between the first two years of medical school, students complete one or two research rotations. During the fall and spring semesters of year one and the fall semester of year two, students take a graduate course or complete a research rotation.

Second phase: During the PhD phase, students complete all requirements of their PhD program. They also participate in the MSTP Clinical Tutorial for at least one year in a patient-based clinical specialty. A second year of MSTP Clinical Tutorial is optional.

Third phase: In the final phase, students complete years three and four of the University Program medical school curriculum. The focus is clinical training, but research electives can be taken for part of year four.

Although each of these three phases has a different focus, opportunities exist for students to pursue both research and clinical training in each phase. The philosophy of the Case MSTP is to integrate medicine and science throughout the program as much as possible.

The CWRU MSTP is run by faculty, staff, and students. The MSTP Council is a body of students that plans and runs certain aspects of the program. The administrative director, program coordinator, and program assistant have many important roles and run the day-to-day management of the program. The co-director is involved in decisions at all levels of the program and is one of the primary advisors for students in the first two years of the program. The director is responsible for all aspects of the program, is a primary advisor for students in the first two years of the program, and is available to students for advice at any stage. The MSTP Steering Committee makes decisions on MSTP policy, curriculum planning, student admissions, approval of mentors and evaluation of students.

Incoming MSTP students are expected to enter the program on or about July 1. The MSTP summer retreat, usually held in early July, provides an important orientation to the program and includes sessions and workshops for program and professional development.

Advising System

The program director provides advising to students in all phases of the program. The MSTP director and co-director advises students in the first two years on research rotations and course work. Students may also meet with an MSTP Steering Committee member representing an area of research interest or with the MSTP director. During the PhD training period, mentoring is provided by the thesis advisor and thesis committee, which includes a member of the MSTP Steering Committee and a member with an MD degree. MSTP students are full members of the medical school class and enter one of the four academic societies of the University Program when they matriculate in the program. The society dean provides important advice on matters concerning the MD curriculum.

Classes and Research Rotations in Years One and Two

During years one and two of the University Program, MSTP students register for 9 credit hours of graduate course work each semester.

Plan of Study

First Year	Units		
	Fall	Spring	Summer
Integrated Biological Sciences I (IBIS 401)	4		
Clinical Science I (IBIS 411)	2		
Research Rotation in Medical Scientist Training Program (MSTP 400)*	0-3		
Integrated Biological Sciences II (IBIS 402)		4	
Clinical Science II (IBIS 412)		2	
Research Rotation in Medical Scientist Training Program (MSTP 400)*		0-3	
Introduction to MSTP (MSTP 401)			0
Year Total:	6-9	6-9	

Second Year	Units	
	Fall	Spring
Integrated Biological Sciences III (IBIS 403)	4	
Clinical Science III (IBIS 413)	2	
Research Rotation in Medical Scientist Training Program (MSTP 400)*	0-3	
Graduate School courses		3-4
601 Research (in specific program)		5-6
Year Total:	6-9	8-10

Total Units in Sequence: 26-37

* MSTP 400 Research Rotation in Medical Scientist Training Program or an appropriate graduate school course.

IBIS 401 Integrated Biological Sciences I, IBIS 402 Integrated Biological Sciences II and IBIS 403 Integrated Biological Sciences III are 4 credits each. IBIS 411 Clinical Science I, IBIS 412 Clinical Science II, and IBIS 413 Clinical Science III are 2 credit hours each. In contrast to their fellow medical students, MSTP students are graded during years one and two of the medical school curriculum for these graduate courses, which provide graduate school credit for the medical school curriculum. These grades are for graduate school purposes and do not affect standing in the medical school.

In addition to the medical curriculum, students take MSTP 400 Research Rotation in Medical Scientist Training Program or one 3-4 credit graduate school course per semester in the first two years. Graduate courses are scheduled in the afternoon in the fall and spring semesters to avoid conflict with the medical school curriculum. MSTP students will be registered for MSTP 400 during the summer terms before each of the first two years of medical school. Students also may complete a research rotation instead of a graduate school course during the fall or spring semester.

The PhD Phase

After completion of the second year of medical school, each student chooses a PhD thesis mentor, joins a specific PhD program, and completes any remaining graduate school course work and other requirements for the PhD degree. The following training programs are affiliated with the MSTP. (If the training program is not itself an independent PhD program, the program through which it is offered is indicated in parentheses.)

- Biochemistry
- Biomedical Engineering
- Cancer Biology (Pathology)
- Cell Biology
- Clinical Translational Science
- Epidemiology and Biostatistics
- Genetics and Genome Sciences
- Immunology (Pathology)
- Molecular Biology and Microbiology
- Molecular Virology
- Neurosciences
- Nutrition
- Pathology (Molecular and Cellular Basis of Disease)

- Pharmacology
- Physiology and Biophysics
- Systems Biology and Bioinformatics

All MSTP students are required to take IBMS 450 Fundamental Biostatistics to Enhance Research Rigor & Reproducibility and IBMS 500 On Being a Professional Scientist: The Responsible Conduct of Research during the spring semester of their third year in the program. IBMS 501 Responsible Conduct of Research for Advanced Trainees is offered every spring semester (beginning 2020). The SOM requires that MSTP students who are preparing to re-enter medical school, register for IBMS 501.

Clinical Tutorial, Clinical Refresher Course and Years Three and Four of Medical School

During the PhD thesis phase, MSTP students take the MSTP Clinical Tutorial, which provides a unique longitudinal part-time clinical experience. The MSTP Clinical Tutorial is a year-long course that enhances clinical skills for year three of medical school. It also serves a special career development objective by allowing students to balance medical and scientific interests and explore the connections between these areas. The MSTP Clinical Tutorial, offered during the PhD phase, is an example of the integration of science and medicine in the CWRU MSTP. An optional MSTP Clinical Refresher course may be taken before the start of year three. After completion of the PhD, MSTP students are enrolled in medical school to complete the requirements for the MD (see description provided for the University Program (<http://bulletin.case.edu/schoolofmedicine/md/#universityprogramtext>)).

MSTP Activities

The MSTP supports several activities that enhance the scientific and professional development of students. These activities also foster a vibrant and collegial MSTP community with a strong sense of mission in the training of physician scientists. The student-directed MSTP Council coordinates many activities of the CWRU MSTP. The Council meets once each month to discuss activities that are run by different student committees. The overall goals of the MSTP Council are to identify objectives for the program, to allow students to initiate programs to enhance the MSTP, to encourage increased student involvement in the operation of the MSTP, and to enhance development of leadership skills of MSTP students. The president, vice president, and secretary are all elected for a one-year period. Committees are led by 1-3 committee chairs who take charge of committee activities and coordinate the involvement of other students in the committee activities. All students are welcome and encouraged to participate in the various committees and to attend the council meetings. Recent Council committees and other program activities have included the following:

1. Monthly Dinner Meeting Committee

This committee is responsible for planning monthly dinner meetings, selecting topics, speakers, and menus. The series is organized by students and is attended by students, Steering Committee members, and research mentors. Invited speakers (students, faculty, alumni and outside speakers) address issues pertinent to research, professional issues, career development or other topics of interest. The informal environment at these gatherings promotes social and professional interactions.

2. Communications and Webpage Committee

This committee organizes communications and the CWRU MSTP website content.

3. Summer Retreat Committee

This committee plans the summer retreat.

4. Intro to MSTP

This committee organizes events for first year MSTP students, to integrate them into the program and the community.

5. Community Service Committee

Plans events for involvement of MSTP students in community service.

6. Social Committee

This important committee plans fun events throughout the year!

7. Student Representative to Faculty Council

One student is selected to represent the MSTP on Faculty Council.

8. Student Representative to the Committee on Medical Education

9. Representative to the Graduate Student Senate

10. MSTP Women's Committee

Women in the MSTP organize luncheons or other meetings to discuss issues that face women pursuing careers in science. Students may invite a successful woman scientist who provides a role model as a physician scientist.

11. Scientific meetings

The program strongly encourages students to present their research at national or international meetings and provides financial support to pay for part of meeting travel expenses (other funding is obtained from the research mentor). In addition to the general meeting support for all students, each year two students are offered the opportunity to attend the annual MD/PhD national student conference in Colorado or the American Physician Scientist Association annual meeting in Chicago, with all expenses paid by the MSTP.

12. Research symposia

MSTP students are encouraged to present their research at CWRU student symposia, including the annual Graduate Student Symposium and the Irwin H. Lepow Student Research Day. These symposia feature a nationally recognized keynote speaker, and students have the opportunity to interact extensively with the noted scientist. A committee awards prizes for outstanding student presentations.

13. Summer retreat

The annual MSTP summer retreat is a two-day event focusing on scientific presentations, professional development and program planning for the upcoming academic year.

14. Works in Progress Seminar Series

Students in their research years present their thesis work to the department through an oral presentation.

Assessment of MSTP Students

Students in the MSTP are assessed for the medical school component of the program in the same manner as students in the University Program, with the exception that grades are awarded for those courses in the MD curriculum in years one and two that receive graduate school credit and are used to satisfy requirements for the PhD degree. Students must satisfactorily complete all requirements for both the MD and the PhD.

IBIS Courses

IBIS 401. Integrated Biological Sciences I. 1 - 9 Units.

A four-semester sequence encompassing anatomy, biochemistry, physiology, pharmacology, pathology, and microbiology.

IBIS 402. Integrated Biological Sciences II. 1 - 9 Units.

A continuation of IBIS 401.

IBIS 403. Integrated Biological Sciences III. 1 - 9 Units.

A continuation of IBIS 402.

IBIS 411. Clinical Science I. 2 Units.

IBIS 412. Clinical Science II. 2 Units.

IBIS 413. Clinical Science III. 2 Units.

IBIS 434. Integrated Biological Sciences in Medicine. 6 Units.

This course is open only to candidates enrolled in the M.D./M.S. program (College plan). Registration is for the Spring semester of the second year in medical school. The course content includes the areas of hematology, gastroenterology and renal physiology. Students will also be required to participate in Process of Discovery. Assessment of performance will be through reaching required levels of competency for the medical areas identified above and by the evaluation of a term paper. Recommended preparation: First three semesters of medical school and currently a medical student in good standing.

IBIS 451. Clinical Science (for M.D./M.A. Bioethics Students). 3 Units.

IBIS 600. Exam in Biomedical Investigation. 0 Unit.

Students are required to pass an examination established for each student, generally reflecting the preparation and oral defense of a written report on the project. Prereq: Must be enrolled in MD/MS Biomedical Investigation program.

MSTP Courses

MSTP 400. Research Rotation in Medical Scientist Training Program. 0 - 9 Units.

All students must complete research rotations in a minimum of three different MSTP-approved laboratories and submit rotation reports and rotation evaluations for each to the MSTP office. All three of the rotations must be completed before the beginning of each student's third year of the program. The main purpose of research rotations is to aid the student in selecting a laboratory for their thesis work.

MSTP 401. Introduction to MSTP. 0 Unit.

Focus and Scope of Course: The course examines the unique challenges that MSTP students face as they navigate a dual degree program. The course will explore strategies that successful MSTP students employ, including mentor choice, time management, strategy and networking. The course will also offer exposure to the various resources available at CWRU for medical and graduate students. Lastly, through journal clubs and formal lecturing, the critical thinking required of an MSTP student will be explored. Objectives: Students will be able to -Employ successful strategies for research rotation set-up and mentor choice - Enunciate strategies for the reconciliation of dual career training with an emphasis on networking, granting and timing -Employ the critical thinking required for manuscript critique and employ successful strategies in both oral and written presentation. Required Texts: None, however, manuscripts may be assigned and will be provided in pdf format. Format and Expectations: As the class is meant to be in dialogue format, meaningful class participation is expected and required. An individual cannot participate if he or she is absent, therefore, attendance is required. If there is a conflict with a required medical school assignment or activity, the medical school activity takes precedence, and attendance in the MSTP course will be waived for that session. Individual students will at times be assigned responsibility for leading the discussion relevant to specified readings. It is expected that all students will complete the readings and assignments prior to the start of the class at which the reading was assigned. Grading: Grading will be Pass/Fail. If students are present at all sessions (excepting when required for an alternative activity at the medical school and excepting excused absences with permission from the instructor), and if the student makes an attempt at a meaningful contribution to the discussion, it is anticipated that all students will pass.