

THE INTERDISCIPLINARY SCIENTIST TRAINING PROGRAM

The Interdisciplinary Scientist Training Program (ISTP) is the doctoral program of the University of Chicago's Medical Scientist Training Program (MSTP). The goal of the NIH-supported MD/PhD program is to train the next generation of physician-scientist leaders. Graduates of the MSTP are awarded a MD from the Pritzker School of Medicine (<https://pritzker.uchicago.edu/>) and a PhD from the Interdisciplinary Scientist Training Program (ISTP). (<https://pritzker.uchicago.edu/academics/mstp-interdisciplinary-scientist-training-program/>)

MSTP students take graduate courses and perform their PhD thesis work under the umbrella of the ISTP. This novel, highly adaptable program allows students full access to the superb graduate programs within the Division of the Biological Sciences (<http://biosciences.uchicago.edu/>), the Division of the Physical Sciences (<https://physical-sciences.uchicago.edu/>), and the Pritzker School for Molecular Engineering (<https://pme.uchicago.edu/>). Via their specialization, the ISTP allows students to pursue training in one field or to craft a unique course of study that integrates two classical disciplines. Examples of the latter include computational biology and human genetics, structural biology and immunology, or developmental biology and microbiology. Such integrations reflect the evolution of biomedical research in which several disciplines are brought to bear on important questions in human disease.

The first year of the program combines medical and graduate school coursework. Students then typically begin their PhD thesis research work and return to the second year of medical school after a successful PhD defense. This structure ensures a focused, intensive research experience and preserves the continuity of clinical training. Typically, MSTP trainees complete both degrees in eight years.

PROGRAM OF STUDY

The goal of the Interdisciplinary Scientist Training Program is to train the next generation of physician-scientist leaders. Our program is designed to provide all ISTP students with rigorous scientific training that prepares them to excel in their field of interest, while providing the flexibility to forge new connections between traditional scientific areas.

CURRICULUM

In the Summer Quarter, prior to the start of medical school, incoming students begin an MSTP-only anatomy course, and finish the course with their medical school colleagues in August. During the Autumn, Winter, and Spring Quarters, students take graduate school courses in addition to their medical school courses. Typically, a total of 3-5 graduate school courses will be finished by the end of the first year. The MSTP Faculty Associate Director for Curriculum will meet individually with each student every quarter before registration for the coming quarter to determine which course will best ensure that the student is adequately prepared to embark on their graduate work when they join a lab.

Each ISTP student completes two lab rotations during the summer between their first and second year. These rotations allow students to identify their future PhD mentors in their area of interest.

All first year ISTP students participate in the Variable Topics Journal Club course. This course provides an in-depth primary-literature based examination of basic science courses that complement the Pritzker curriculum, and allows students to develop an appreciation for the primary literature, learn to critically evaluate articles, learn more about experimental design, learn how to evaluate and present an overview of a field, and become proficient in overall presentation skills.

SPECIALIZATIONS

ISTP requires students to choose an area of specialization, typically aligned somewhat with a graduate program, providing an additional intellectual community. Specializations, in general, consist of 5 courses: 3-4 that are programmatic, and 1-2 that are elective/basic advanced knowledge courses. However, some specializations require more coursework due to the nature of the research area. All courses will be graduate courses offered by an established PhD program. In addition to the coursework, specializations require that the student participate in programmatic activities such as research-in-progress, journal club, retreats (if available), seminar series, etc. All students must present their research annually in a program-approved venue.

BREAKING FROM MEDICAL SCHOOL TO COMPLETE GRADUATE RESEARCH

At the University of Chicago, students in the MSTP have the flexibility to choose to break from medical school to pursue their graduate research in ISTP either after the first year of medical school or after Spring Quarter of their second year of medical school. Most students take 4 years to complete their PhD research and will successfully defend their dissertation prior to returning to medical school.

ADMISSION

Admission to the ISTP is exclusively through the joint application process with the Pritzker School of Medicine via the American Medical College Application Service (AMCAS). Applicants cannot apply through the UChicago BSD graduate application process.

MORE INFORMATION

Further information can be found at the MSTP website (<https://pritzker.uchicago.edu/mstp-program-overview/>).

INTERDISCIPLINARY SCIENTIST TRAINING COURSES

ISTP 30420. Variable Topic Journal Club: Cell & Developmental Biology. 25 Units.

This course provides an in-depth examination of contemporary primary literature in cell and developmental biology. This course develops students' ability to critically evaluate articles, learn and critique experimental design, evaluate and present an overview of different areas of biology, and develop presentation skills. The topic for Autumn Quarter is Cell & Developmental Biology.

Instructor(s): N.P. Mitchell, S.F. Banani Terms Offered: Autumn

ISTP 30440. Variable Topic Journal Club: Physiology. 25 Units.

This course provides an in-depth, primary literature-based examination that builds on the basic science courses taken as part of the Pritzker Phoenix Curriculum. Students develop an appreciation for the primary literature, critically evaluate scientific articles, gain deeper insight into experimental design, synthesize and present overviews of specific fields, and strengthen their overall presentation skills. The course consistently focuses on physiology and pathophysiology as they apply to human disease and clinical medicine.

Instructor(s): C. Weber Terms Offered: Winter

ISTP 30441. Variable Topic Journal Club: Grant Writing. 50 Units.

The purpose of this class will be to provide participants with skills necessary for writing successful grant proposals. The class will emphasize how to craft hypotheses that are based on current published research and to develop rigorous experimental approaches to test these hypotheses. Special emphasis will be placed on developing an outstanding specific aims page that frames a hypothesis within the current literature, justifies the importance of the question and then proposes an integrated experimental plan that tests the central hypothesis.

Instructor(s): M. Clark Terms Offered: Spring

ISTP 30460. Variable Topic Journal Club: Statistics. 25 Units.

Navigating the application of statistics and computational approaches in science is essential for both experimental design and data analysis. The reliability of scientific reports has repeatedly been scrutinized in recent years due to questionable, if not fraudulent, application of statistical tests. Furthermore, in an era of increasingly accessible computational tools, big data, and an emphasis on open-access databases, the need for rigorous training in statistical methods and computational skills has become more important than ever. As a requirement for admission to the Pritzker School of Medicine, all MSTP students must have completed college-level coursework in statistics or bio-mathematics. However, because the current landscape of scientific work demands the ability to engage with these skills at even greater depth, this course aims to provide a review of these concepts while also promoting discussion and hands-on training in these methods.

Instructor(s): D. Kondrashov, C. Stayart Terms Offered: Summer

ISTP 40000. ISTP Thesis Research. 300.00 Units.

Independent research on variable topics in preparation for completing the dissertation.

Instructor(s): K. McCann Terms Offered: Autumn Spring Summer Winter

ISTP 42000. AI in Medicine and Research. 75 Units.

This lecture and paper discussion-based course is designed to introduce students to artificial intelligence approaches to clinical care decision making, clinical diagnostics and biomedical research. Students will learn fundamental principles in machine learning including foundational models, large language models, and convolutional neural networks. Students will also learn and discuss ethical issues related to AI and how to critically evaluate AI-based research. This course will teach students to be intelligence consumers of AI-based research. Indeed, future clinical decision making will be enabled by AI. The class will also provide important foundational knowledge for students who want to incorporate AI approaches in their future research.

Instructor(s): M. Clark Terms Offered: Winter

Equivalent Course(s): MEDC 78100

