The University of Chicago

Medical Scientist Training Program

Student Handbook

2023-24 Edition

Table of Contents

Purpose of the MSTP Student Handbook

This handbook detail programmatic requirements and policies for The University of Chicago Medical Scientist Training Program (MSTP), refers to key dates for MSTP student deadlines and milestones, overview the Interdisciplinary Scientist Training Program (ISTP) curriculum, and detail select resources that are relevant to MSTP students' success.

In general, academic policies and disciplinary concerns follow Biological Sciences Division (BSD) policies while dual-degree students are in the graduate phase; and, likewise, Pritzker School of Medicine (PSOM) policies while in the medical phase. As supported by the university Student Manual, discretion is given to the program's respective area (i.e., MSTP/ISTP) for academic and disciplinary concerns. This handbook is intended to serve as a static resource for MSTP students, and the content will be systematically reviewed and updated annually. Any changes made mid-year will be announced and noted here.

For questions pertaining to any policies, expectations, or consequences, please contact Alison Anastasio, Associate Dean of Students for the MSTP (aanastasio@bsd.uchicago.edu).

2023-1204 aea

MSTP Leadership

Marcus Clark, MD
Faculty Director
mclark@medicine.bsd.uchicago.edu
(773)-702-0202

Alison Anastasio, PhD
Associate Dean of Students, Executive Director
aanastasio@bsd.uchicago.edu
(773) 834-3661

Stephen Meredith, MD, PhD
Faculty Associate Director for Admissions
scmeredi@uchicago.edu
(773) 702-1267

Megan McNerney, MD, PhD
Faculty Associate Director for Curriculum
lbrd@uchicago.edu
(773) 702-1083

Nija Givens, MS
Assistant Director, Admissions and Student Affairs
nija.givens@bsd.uchicago.edu
(773) 702-9755

Haley Burkhardt, MS
Program Administrator
haley.burkhardt@bsd.uchicago.edu
(773) 834-3163

Allicia Washington-White, MS
Business Coordinator
allicia.washington-white@bsd.uchicago.edu
(773) 795-1204

MSTP Steering Committee

The MSTP steering committee is comprised of faculty and administrators in the Biological Sciences Division and Pritzker School of Medicine who offer input and guidance for the mission and vision of The University of Chicago's MSTP. The steering committee aims to convene annually prior to the MSTP retreat.

Mark Anderson, MD, PhD
Executive Vice President for Medical Affairs, Dean of the Division of the Biological Sciences (BSD) and Dean of the Pritzker School of Medicine

Vineet Arora, MD
Professor, Medicine
Dean for Medical Education, Pritzker School of Medicine

Marcus Clark, MD
Professor, Medicine
Chief, Section of Rheumatology
Director, Medical Scientist Training Program

David Kovar, PhD
Professor, Department of Organismal Biology and Anatomy
Dean for Graduate Affairs, Biological Sciences Division
…

Alison Anastasio, PhD
Associate Dean of Students and Executive Director, Medical Scientist Training Program

Ruth Anne Eatock, PhD
Professor, Neurobiology
Committee on Computational Neuroscience

James Liao, MD
Harold Hines, Jr. Professor, Medicine
Chief, Section of Cardiology
Director, Physician Scientist Development Program

Megan McNerney, MD, PhD
Associate Professor, Department of Pathology
Committees on Cancer Biology and Genetics, Genomics and Systems Biology
Associate Director of Curriculum, Medical Scientist Training Program

Stephen Meredith, MD, PhD
Professor, Department of Pathology

Associate Director of Admissions, Medical Scientist Training Program

Raghu Mirmira, MD, PhD
Professor, Medicine
Associate Director of Admissions, Medical Scientist Training Program
Director, Translational Research Center; Vice Chair for Research

Kenneth Polonsky, MD
Richard T. Crane Distinguished Service Professor in Medicine
Senior Advisor to the President

Nancy Schwartz, PhD
Professor of Pediatrics, Biochemistry and Molecular Biology,
Committee on Molecular Metabolism and Nutrition
Dean for Postdoctoral Affairs
Director, Growth, Development, and Disabilities Training Program

Julian Solway, MD
Walter L. Palmer Distinguished Service Professor of Medicine
Professor of Pediatrics
Dean for Translational Research

MSTP Student Council President
2023-2024: Steven Song

MSTP Curriculum Committee

The MSTP curriculum committee include faculty from the Biological Sciences Division, Physical Sciences Division, and School for Molecular Engineering who advise the MSTP on curricular requirements to fulfill the PhD in ISTP. Committee members reflect MSTP students' common specializations and are determined by MSTP Director and the MSTP Associate Director of Curriculum.

Biochemistry/Molecular Biology
Erin Adams
Stephen Meredith
Tobin Sosnick

Biophysics
Erin Adams
Adam Hammond
Tobin Sosnick

Cancer Biology
Kay MacLeod
Megan McNerney

Chemistry
Vera Dragisich
Ka Yee Lee

Developmental Biology
Jill de Jong
Kay Macleod
Ivan Moskowitz
Vicky Prince

Ecology & Evolution
Greg Dwyer

Genetics & Systems Biology
Yoav Gilad
Louis Barreiro

Immunology
Bana Jabri
Marcus Clark

Integrative Neurobiology
Harriet de Wit

Medical Physics
Sam Armato

Microbiology Glenn Randall
Dominique Missiakas

Molecular Engineering
Juan de Pablo
Jun Huang

Neurobiology
Christian Hansel
Dan McGehee

Public Health Sciences
Brandon Pierce

MSTP Admissions Committee

The MSTP Admissions Committee is led by the Faculty Associate Director for Admissions and includes BSD, PSD, and PME faculty who expressed an interest in assisting with the program's admissions and/or were identified and asked to join by MSTP leadership. The committee also includes three senior students as voting members. All faculty committee members assist with application screening, interviewing candidates, admissions events, and final admissions decisions. In addition to those formally serving on the Admissions Committee, additional UChicago faculty assist with interviewing MSTP candidates based on an applicant's request and/or MSTP leadership's discretion. Student members assist with admissions visits, ongoing communications with admitted students, interviews, and final admissions decisions. The admissions process is administratively managed by the Assistant Director for Admissions and Student Affairs.

Alison Anastasio, PhD (Ecology and Evolution)
Eric Beyer, MD, PhD (Cancer Biology)
Anita Chong, PhD (Immunology)
Marcus Clark, MD (Immunology)
Axel Concepcion, PhD (Immunology)
Michael Drazer, MD, PhD (Medicine, Hem/Onc)
Wei Du, PhD (Cancer Biology)
Ben Glick, PhD (CMB)
Adam Hammond, PhD (Biophysics)
Jun Huang, PhD (Molecular Engineering)
Dezheng Huo, PhD (Public Health Sciences)
Norm (Naoum) Issa, MD, PhD (Neurobiology)
Aly Khan, PhD (Immunology, Cancer, Computational Biology)
Tanner Martinez*
Dan McGehee, PhD (Neurobiology)
Megan McNerney, MD, PhD (Pathology, Cancer, Immunology)
Raghu Mirmira, MD, PhD (Medicine, Metabolism)
Alexis Monical, PhD*
Scott Oakes, MD (Pathology, Cancer Biology)
Luka Pocivavsek, MD, PhD (Chemistry, Surgery)
Vicky Prince, PhD (DRSB)
Glenn Randall, PhD (Microbiology)
Nathan Schoettler, MD, PhD (Immunology)
Murray Sherman, PhD (Neurobiology)
Tobin Sosnick, PhD (BMB, Biophysics, Chemistry)
Wim Van Drongelen, PhD Neurobiology)
Christopher Weber, MD Pathology)
Kierstin Webster*
Wei Wei, PhD (Neurobiology)

**student voting member*

Academic Calendar

The UChicago MSTP adheres to both the University of Chicago and Pritzker School of Medicine academic calendars. Students should be aware that discrepancies exist between the university and medical school calendars and plan accordingly. Incoming students will begin the program in summer quarter.

2023-24 University of Chicago Academic Calendar

2023-24 Pritzker School of Medicine Academic Calendar

Academic and University Policies

In line with The University of Chicago's Student Manual,

> The primary purpose of policies and regulations, and the articulation of expected standards of student conduct, is to further the mission of the University and to protect the well-being of the community. These policies and regulations enable all the members of the University to function as a community and respond to situations that threaten or violate that community.

MSTP adheres to the Student Manual's outline for University Policies, Academic Policies and Requirements, Administrative Policies and Requirements, and Student Life and Conduct. Policies outlined in the Student Manual pertain to all MSTP students in all years of the program regardless of medical or graduate student status. However, as these policies allow for area-specific regulation, the Biological Sciences Division and Pritzker School of Medicine enforce specific policies that do apply to any MSTP student when in the graduate phase and medical phase, respectively.

Failure to meet curricular milestones, make satisfactory academic progress, or maintain professionalism standards will result in academic probation and, if not remediated, may result in dismissal from the MSTP.

Academic Policies: Medical Phase

While in the medical phase of the MSTP (i.e., MS1, MS2, MS3, MS4), the MSTP follows the Pritzker School of Medicine's School Policies and Academic Guidelines. As needed, the MSTP will refer to the wider university policies as outlined in the Student Manual.

Academic Policies: Graduate Phase

While in the graduate phase of the MSTP (i.e., G1, G2, G3, G4, G5+), students are subject to Biological Sciences Division policies. Many of the BSD policies are informed or identical to wider university policies as outlined in the Student Manual. Because students are earning their PhD through the BSD (even though they may be training in a lab in another Division), policies default to those of the BSD.

Academic Policies: MSTP-Specific

Given the unique nature of the dual degree program, policies related to dismissal from the program are MSTP-specific. If a student does not adhere to BSD policies while in the PhD phase, PSOM policies while in the MD phase, or is not making sufficient academic progress, a student will be put on academic probation. If violations to policy aren't rectified by the date agreed to in academic probation, a student may be dismissed from the MSTP. If dismissed from the MSTP, a student may petition the Pritzker School of Medicine to pursue the MD-only pathway at the student's own cost.

Curricular Program of Study

Each trainee in The University of Chicago's Medical Scientist Training Program (MSTP) will earn both a MD and PhD based upon (a) meeting all academic requirements; and (b) remaining in good academic and disciplinary standing with the MSTP and university at large. The typical pathway for the dual-degree program is illustrated below. However, in some cases a student may choose a '2-4-2' pathway wherein completion of the first two years of pre-clinical medical school training precedes PhD training and concludes with the final two clinical training years of medical school. In the new Phoenix Curriculum, a student maybe also break after Phase 1. A "typical" pathway with expectations for milestones can be found in Appendix B.

<table>
<tr><th colspan="8">1-4-3 MSTP Pathway</th></tr>
<tr><th>MSTP Yr 1</th><th colspan="4">MSTP Yrs 2-4+</th><th>MSTP Yr 6</th><th>MSTP Yr 7</th><th>MSTP Yr 8</th></tr>
<tr><td>Med 1 + Grad coursework</td><td>Grad 1</td><td>Grad 2</td><td>Grad 3</td><td>Grad 4</td><td>Med 2</td><td>Med 3</td><td>Med 4</td></tr>
<tr><td>Phoenix Phase 1</td><td colspan="4"></td><td>Phase 1</td><td>Phase 2</td><td>Phase 3</td></tr>
<tr><td>Preclinical training:</td><td colspan="4">Graduate Training</td><td>Scientific Fdns</td><td>Clinical Training: Core Clerkships</td><td>Clinical Training: Differentiation & Transition</td></tr>
</table>

MD Overview: The Pritzker School of Medicine

The University of Chicago's Pritzker School of Medicine (PSOM, Pritzker) offers a robust curricular and co-curricular experience culminating in the award of a Doctor of Medicine (MD) degree. Academic requirements are outlined in detailed in Pritzker's annual Academic Guidelines handbook. As the MSTP works collaboratively with Pritzker, questions or concerns regarding MD-specific requirements should be jointly directed to PSOM and MSTP staff, so all are advised if any changes need to be communicated. If any students are unsure of who to contact, they may initially reach out to MSTP's current Associate Dean of Students/Executive Director.

In some respects, the MSTP curricular requirements differ from that of MD-only matriculants with primary discrepancies outlined below. Additional information regarding curricular requirements for the PhD phase are discussed separately in this handbook. All students will engage in required advising sessions with MSTP and Pritzker to ensure all curricular requirements are met.

MS1 Year

MSTP MS1s begin their curricular program at the start of summer quarter (mid-June) in accordance with the University academic calendar. Students begin their training with the Human Body (Anatomy) course led by a faculty course director and one or more graduate teaching assistants. The summer quarter (June-July) section of the Human Body course is restricted to MSTP MS1s only. Beginning in August, MSTP MS1s will join their MD counterparts to complete remaining curricular requirements of Human Body.

MSTP students are exempt from "Scholarship and Discovery" research-based PSOM requirements due to earning a PhD as part of their dual-degree training.

MS2 Year
MSTP MS2s are exempt from Scholarship and Discovery requirements due to earning a PhD as part of their dual-degree training. Students take the USMLE Step 1 exam in early Spring. Students participate in the two-week Foundations in Clinical Medicine (FICM) at the end of M2 in preparation for rotations on the wards.

MS3 Year
MSTP MS3s complete the same curricular requirements as MD counterparts with no additional requirements or exemptions. Students returning to MS3 after their PhD completion are required to participate in FICM in mid-March.

MS4 Year
MSTP MS4s are required to complete a total of 1350 units. Beginning in 2015-16 to present day, students are required to complete Critical Appraisal of Landmark Literature to form a foundation of landmark studies and to better understand clinical study design. For 2016-17 through 2018-19, students were also required to enroll in the Topics in Biomedical Data Analysis (Big Data) course to gain high-level knowledge for how large data sets are used in academic medicine contexts.

During the MS4 year, students are exempt from Scholarship and Discovery requirements due to earning a PhD as part of their dual-degree training. The PhD will count toward 300 units toward the MD.

Breaking from and Returning to Pritzker School of Medicine

Students will break from and return to the Pritzker School of Medicine at two discrete points in their training. Both MSTP and Pritzker will be in proactive communication with dual-degree students regarding their plans; likewise, students are expected to inform MSTP and Pritzker of any changes in their plans.

When a MSTP student elects to *break* from their first or second year of medical school studies to commence their full-time graduate PhD training (their G1 year), each student will complete and submit a Committee on Academic Promotions (CAP) 'Petition for Leave or Deferral' form to the Pritzker School of Medicine Registrar by the stated deadlines for that given academic year.

Similarly, when a MSTP student elects to *return* to medical school after completing their final year of PhD training, they will complete and submit a CAP 'Petition to Return to Medical Studies' form to the Pritzker School of Medicine Registrar also in accordance with the appropriate deadlines. The MSTP will facilitate specific communications regarding this process and access to the appropriate forms.

Students must have successfully defended and deposited their PhD dissertation to return to the Pritzker School of Medicine. Special permission must be obtained from the MSTP and Pritzker to return without having been awarded the PhD. *It is also required that the student has submitted at least one first-author primary research paper* (in-press preferred).

In Autumn Quarter annually, the MSTP will contact all late-phase graduate students to determine their plans for completion of the PhD. For those returning to MS2 in the new Phoenix Curriculum (starting in 2024), several self-learning modules and standard patient exams will need to be completed before the start

of MS2. The most current information on requirements during this curricular transition will come from Pritzker School of Medicine. For those returning to MS3 in the new curriculum (starting in 2025), FICM is required and the MS3 year begins in Spring Quarter. One or two 4-week rotations may be moved to the MS4 year if a return to the MS3 year is not in sync with the MD-only cohort.

PhD Overview: The Interdisciplinary Scientist Training Program

The Interdisciplinary Scientist Training Program (ISTP) is the PhD-granting graduate program of the University of Chicago's MSTP. All MSTP students at The University of Chicago—regardless of their PhD specialization and/or in what program their PhD studies are based—will earn an ISTP PhD conferred within the Biological Sciences Division with a specialization. They will not earn a PhD from another graduate program (joint MeSH or Ox-Cam students are exceptions).

The goal of the ISTP is to train the next generation of physician-scientist leaders. The 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.

Year 1 of Program (Summer-Spring Quarter)
The first year of the MSTP curriculum includes both medical and graduate school coursework. Students must prioritize medical school requirements during their first year and will layer in graduate courses when/if possible, to meet their PhD specialization core and elective course requirements. The specific requirements are individualized and will be negotiated by the student, the MSTP Associate Director of Curriculum, and the respective specialization's graduate program chair or equivalent. Students will meet individually and in their cohort with the MSTP Faculty Associate Director of Curriculum and Associate Dean of Students to devise a graduate course schedule, knowing that medical school courses take priority in year one. Should students have remaining graduate courses after they complete year one of the program (a common occurrence in some specializations like: Public Health Sciences, Cancer Biology, Biophysics, and Molecular Engineering), they will complete them in their second year of the program or during a period in their training deemed appropriate by the MSTP Faculty Associate Director of Curriculum**.**

Year 1, Summer Quarter. Incoming students begin in Summer Quarter based upon the University of Chicago's academic calendar schedule. All students will complete one half of the medical school requirement ORGB 30001: The Human Body during summer quarter. Historically, three modules of this required course that are covered during summer are: upper limb, lower limb, head, and neck. Following summer quarter, MSTP students join their incoming Pritzker MS1 counterparts to complete the remaining modules of ORGB 30001. In addition to the ORGB 30001 curricular requirement, first-year students will engage in various programmatic requirements as outlined in this handbook.

Year 1, Autumn Quarter. Because the first year integrates both medical- and research-related coursework, the quarterly *ISTP Journal Club* is one way to bridge the two (e.g., reading, writing, and critically reviewing research questions in the field). For autumn quarter, first-year students will complete the Cell/Developmental Biology-focused journal club taught by UChicago faculty and one or more MSTP teaching assistants who previously completed the course*.

Year 1, Winter Quarter. In winter quarter, first-year students will complete the *ISTP Journal Club* focused on Physiology—team taught by select UChicago faculty and MSTP teaching assistant who previously complete the course*.

Year 1, Spring Quarter. In spring quarter, first-year students will complete the *ISTP Journal Club* focused on grant writing which is typically taught by the MSTP faculty director alongside a MSTP teaching assistant who previously completed the course*.

The **ISTP Journal Club is offered during the Autumn, Winter, Spring and Summer quarters of the first year of the program.. The first two quarters (Autumn: cell/developmental biology; Winter: physiology) provide an in-depth primary-literature based examination of basic science courses taken as part of 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. In the Spring quarter, the course focuses on grant writing—an integral part of a research career. In the transition between students' first- and second-years of the program (regardless of their decision to pursue their first year of graduate or second year of medical school studies), biostatistics is the focus via a student-led journal club on basic probability and statistics as well as specific methods and analyses commonly used across PhD specializations.*

General curricular requirements for Year 1 of UChicago's MSTP[^].

Year One Curricular Requirements	**ISTP (PhD)**	**PSOM (MD)**
Summer	MSTP Orientation/All Stars seminar series	The Human Body
Autumn	Journal Club: Cell/Developmental Biology; 1 graduate course	The Human Body, Health Care Disparities in America, The American Healthcare System, Clinical Skills 1a, Longitudinal Program
Winter	Journal Club: Physiology; 1 graduate course	Tissues: Cell and Organ Physiology, Clinical Skills 1b, Doctor-Patient Relationship
Spring	Journal Club: Grant Writing; 1 graduate course	Cellular Pathology & Immunology; Microbiology: Medical Biology, Clinical Skills 1c

[^]MSTP students are exempt from any Scholarship and Discovery curricular requirements and the Medical Evidence course given their separate PhD requirements. MSTP students may also petition for exemption from Medical Cellular Biology and Genetics. The petition process is organized by MSTP and approved or not approved by Pritzker School of Medicine.

Summer Quarter Directly Following Year 1 of the Program (fifth quarter; transition quarter)
In the Summer Quarter directly following students' first full year of the program, all students regardless of a 1-4-3 or 2-4-2 pathway complete a final *ISTP Journal Club* focused on statistics and using the R coding language. The seven-week course introduces the basic concepts of statistics as applied to the bio-medical and public health sciences. Emphasis is on the use and interpretation of statistical tools for data analysis. Topics typically include (a) descriptive statistics; (b) probability and sampling; (c) the methods of statistical inference; and (d) an introduction to linear and logistics regression. A detailed syllabus is released to the enrolled students prior to the start of the course. No students external to the MSTP are eligible to enroll.

- If a rising second-year students has no statistics background, the course *PBHS 32100: Introduction to Biostatistics* offered by Public Health Science (PHS) or an equivalent offering may be completed alternatively.
- If a rising second-year students has *advanced* statistics experience, they may petition to be approved for a separate statistics-related course; such a decision would be made by the MSTP Faculty Associate Director of Curriculum.

In addition to completion of the statistics journal club, students will complete at least two and no more than three (unless explicit permission is given to a student) laboratory rotations of at least 5-weeks in accordance with the larger Biological Sciences Division guidelines. Students will also complete a preliminary exam as outlined in the Preliminary Exam section.

Laboratory Rotations. In the summer quarter following students' first year of the program—regardless of following a 1-4-3 or 2-4-2—students will engage in at least two and no more than three laboratory rotations lasting at least five weeks. For those whose specialization requires a dual-PI mentorship (e.g., Biophysics), students will likely complete three rather than two rotations. Depending upon the rotation schedule for each student, the rotations may span part of Autumn Quarter in addition to Summer.

Each student will be responsible for approaching PIs to schedule their rotations; typically, scheduling begins in Spring quarter, and conversations between student and PI may begin at any time following students' matriculation to the program. During the first year Winter and Spring quarters students are prompted to meet possible PhD mentors and, if allowed, to attend a lab meetings to get to appreciate the quality of interactions between the Pi and members of the laboratory as well as the interactions between the members of the lab. Students will be supported through individual and group advising led by the MSTP Faculty Associate Director of Curriculum and through peer mentoring programming. Students are also encouraged to take the initiative to research their options independently. Note: Students' laboratory rotations and/or their chosen laboratory does not need to be within the same program/department as their PhD specialization (e.g., a student may specialize in Biochemistry and Molecular Biology but ultimately train in a Molecular Engineering lab).

Should any student not identify an appropriate lab following their requisite two or three rotations, they must meet with the MSTP Director to devise a plan for finding placement.

Students will register for the graduate course *BSDG 40100/40200* for their rotation requirement. At the conclusion of the rotation, the PI assigned a P/F grade and completes an evaluation of performance (internal to the MSTP).

When students choose a lab, they will determine a start-date with their PI, discuss the MSTP mentor-mentee agreement documents, and within three months of their full-time training in the lab submit the required Memorandum of Understanding (MoU) form as coordinated and filed by MSTP for future reference and formal record of the funding agreement terms. The MSTP will send students a fully signed copy of their MoU.

Quantitative Analysis (QBio) Bootcamp. Students officially start the PhD program (ISTP) after breaking from PSOM. Along with the entire entering cohort in the BSD, students participate in Quantitative Analysis Bootcamp in early September. Typically, this week-long course includes:

- Foundational computational training in either a basic or advanced track (that you self-select for)
- Social and bonding activities over the weekend
- Tutorials in mixed skill small groups
- Scientific applications in mixed skill small groups
- The opportunity to meet students and faculty across the BSD

Attending BSD Orientation is optional.

Graduate Phase of Program (G1-4+)

PhD Coursework Requirements. Because students earn their ISTP degree through the Biological Sciences Division (BSD), they must also meet specific BSD PhD requirements. The BSD requires a minimum of nine courses to receive a PhD: First-year medical school courses count toward three such courses (note: these courses are pass/fail); the ISTP Journal Club series (4 Journal Clubs) counts toward one course; and the five graduate level courses that comprise a student's PhD specialization complete the nine total courses for the BSD course requirement. Some specializations (e.g., Biophysics) will require more than nine courses. In these cases, students may not, however, substitute the additional specialization required courses for other required medical school courses, any ISTP Journal Club courses, and/or any ethics requirements. In addition, all MSTP students must complete two teaching assistantships and two ethics courses prior to returning to medical school. In addition, per BSD-wide policies, students must earn a B (not a B-) or better in all core courses for their respective specialization and maintain a B average GPA overall to remain in good academic standing. If/when a student does not earn a B or better in each core course, they must reach out to the MSTP and the course faculty member to discuss a plan to improve their grade or re-take the course. If/when a student does not maintain a B average GPA overall, they will be contacted by the MSTP to discuss a course of action to improve their GPA prior to completing PhD coursework.

Teaching Assistantship Requirement. All BSD graduate students are required to serve as a teaching assistant (TA) in two courses for academic credit to graduate with their PhD degree. Students should wait to begin the TA requirement until at least their second year of training (G1 or M2). Courses may be listed with Pritzker's medical school and be taught at the undergraduate- or graduate-level; however, all courses taught must be listed within the Biological Sciences Division to meet this degree requirement. To be eligible for credit, a course must be offered for the duration of a full quarter and provide the TA significant teaching experience (e.g., giving a full-length lecture, running a lab or field trip, leading regularly scheduled discussion sessions). Courses offered for a partial quarter (e.g., 4 weeks) may not be combined for graduation credit. For students who wish to expand their teaching acumen, a TA training course is offered every Autumn Quarter (BSDG 50000). The TA training course may count as one of the two required TA credits. Students may not TA the same course twice to fulfill graduation requirements and may not TA for pay prior to completing the baseline two-course requirement. In order to receive TA credit, students must register for the course (BSDG 50100/50200/50300), submit the required online TA compact form, and attend a required TA meeting the first week of the quarter. For more information, please refer to the BSD website or contact Melissa Lindberg in OGPA.

Ethics Course Requirements. In the spring of the first year of student's graduate phase (G1), all ISTP students are required to complete the first of two ethics course requirements for academic credit. As of this writing, the course is titled Scientific Integrity and the Ethical Conduct of Research (BSDG

55000). This course is required of all students in the BSD and addresses the basic tenets of scientific integrity and ethical judgment as a scientist. The NIH requires ethics training to continue no less frequently than every five years. To meet this requirement, students must complete an 'advanced' ethics course offered by their respective BSD cluster relative to their original PhD specialization. If/when students cannot complete the advanced ethics course within their respective PhD specialization cluster, they may petition to take a course outside of their cluster and should reach out to the MSTP office for more information.

Required Examinations During the PhD Phase

Preliminary Exam for the PhD Specialization

If typical in the specialization, ISTP students will complete a preliminary exam prior to officially joining a laboratory, administered by the specialization according to its standards. For students embarking upon graduate training after one year of medical school (i.e., 1-4-3, suggested), this exam will take place in the summer quarter following year one of the program. In some cases, specializations might occur earlier in spring quarter. Students whose specializations do not require a preliminary exam will not be required to complete a preliminary exam either. Preliminary exams generally follow one of the following formats:

a) an original written grant proposal that is orally defended.
b) a series of general knowledge questions that are given to the student a short time prior to the oral exam; or
c) a paper or review article addressing questions posed by the examining committee.

If there is an oral portion of the exam, at least one member of the ISTP Curriculum Committee must be an examiner. Students may petition to include an alternate examiner should no ISTP Curriculum Committee member be deemed appropriate. Students should reach out to the MSTP Director to petition.

PhD Qualifying Exam

The ISTP Qualifying Exam consists of two parts:

1) A written proposal of the dissertation project in the form of a modified NIH NRSA F30 or F31 application;
2) A presentation of this proposal to a committee and subsequent discussion (aka "proposal defense" and the first committee meeting). See the 'PhD Committee' section below for details regarding the composition and purpose of the committee.

Writing the Proposal for the Exam. The proposal is written in the form of the scientific portion (i.e., Specific Aims and Research Strategy) of a NIH F30/31 National Research Service Award (NRSA) application. Data to demonstrate feasibility is important but does not need to be generated by the student for the student to be ready for a qualifying examination. Students should review the most recent guidelines for the NIH F30 and focus on the instructions for the Specific Aims and Research Strategy. The proposal should be 10 pages and in NIH formatting.

Preparing for the Oral Exam. Students should consult with all members of the committee as early as possible to understand expectations and identify a date and time for the oral portion of the qualifying examination. To ensure thoughtful and productive feedback, the written dissertation proposal should be

provided to the dissertation committee and the MSTP office two weeks before the qualifying exam. Each committee member should provide a written critique that is due to the committee/student on the day of the exam.

In the exam, typically the student prepares a Powerpoint presentation of their dissertation proposal. The committee asks questions about the proposal and evaluates its scientific rigor, tractability for the dissertation topic, and potential for funding via an NIH F30.

Typically, three hours is sufficient for a qualifying examination, as most are completed within two hours. Because the MSTP does not have its own conference room, students should use resources typically used by the lab to reserve a room for the exam. Each student should be sure they understand the expectations of the committee before the exam.

PhD Committee. The PhD committee consists of at minimum four faculty: the student's PI, at least two faculty members from the student's specialization, and at least one faculty member who has served as a PI or committee member for a MSTP student in the past (should such an individual not overlap with the other three committee members required). The chair of the committee *must* be someone other than the PI. If the PI is inexperienced in training MSTP students and/or is at the Assistant Professor level at the time of committee formation, a faculty member who is both more familiar with training MSTP students and is at least as the Associate Professor level should be appointed as chair.

Committees should be formed by the end of the G1 year prior to the student's Qualifying Exam, as the committee will serve as the examining body of faculty in most cases. The proposed committee members must be submitted via email and approved by the MSTP Faculty Director; the MSTP Associate Director of Curriculum may have additional input. In some cases, a student's PI will request committee members who are external to The University of Chicago and/or a committee member may unexpectedly change institutions part-way through a student's project; in such cases, the Committee Chair will help facilitate any changes to the committee and will inform the student and MSTP Faculty Director of any changes prior to finalizing decisions.

***Role of the PhD Committee*.** When reviewing the written proposal, the committee should pay particular attention to the feasibility of both the project as a dissertation and a grant proposal, as ISTP students are required to submit an NIH F30 application. Given the compressed timeline for the PhD in this dual degree program, a tractable project is critical, as is consistent progress throughout the research phase. To this end, the ISTP requires students to meet with their committees often for guidance and collaboration. The MSTP recognizes that committees are idiosyncratic, and members often have expectations of students according to their home department; if this is the case, expectations of the committee outside of ISTP requirements should be made clear to the student early on.

***Committee Meetings and their Frequency*.** Students must meet with their committee every six months. In no case should committee meetings be more than nine months apart. Failure to do so and submit related materials in a timely way means a student is not in good standing and may be put on academic probation.

Students should notify the MSTP office of the timing of the committee meeting and send a progress report to the committee (and MSTP office) at least one week before the scheduled meeting. The report is

a word-processed 1-2 page (single spaced) summary of the progress made since the previous meeting and any other information of which the trainee wishes the committee to be aware regarding their project. At least three committee members should attend the meeting and no committee meeting should occur without the Committee Chair.

After each meeting, the Chair of the PhD Committee should complete a ISTP Committee Meeting Report and submit it to the MSTP Assistant Director of Admissions and Student Affairs. This is a critical part of the training process as it summarizes the Committee's evaluation of progress and is necessary for the student to remain in good standing in the program.

After the Exam. After successfully passing this exam, the student enters a candidacy for the PhD (i.e., "ISTP: Student's Specialization"). The content of the qualifying exam serves as the roadmap for the student's research program during graduate training and must be successfully passed no more than 12 months following a student's official start date in a lab (typically by the end of autumn quarter of their 'G2' year).

Directly following the successful qualifying examination process, each student must submit a F30 or F31 application no more than 6-9 months later. The NIH has standard deadlines for this application of April 8, August 8, and December 8 annually. The MSTP office will reach out to each student to enforce this requirement. Should a student's research not fit the guidelines of the F30 or F31 funding announcement, an alternative funding opportunity may be identified with the approval of the MSTP Faculty Director. There is no penalty or consequence for not gaining funding from a F30 or F31 (or equivalent) application, as the application is primarily intended to be a learning experience. The student should work closely with their PI to complete the application, and information sessions about the F30/31 application process led by the BSD will be advertised each year.

**Neuro-related specializations include a preliminary exam as part of the qualifying exam. Students are responsible for clarifying expectations of the committee well in advance of the exam.

PhD Dissertation Defense

After the penultimate committee meeting and approval from the Committee to write the dissertation, a student should adhere to all deadlines and guidelines from the University Dissertation Office.

The Dissertation Defense/Exam typically involves a public presentation of the PhD research, and a closed-door defense of the dissertation to the Dissertation Committee. Students should confirm expectations of the Committee well in advance of the

Students must complete all requirements of the PhD, including depositing the dissertation according to quarter-specific deadlines, before petitioning to return to the Pritzker School of Medicine.

MSTP Program Requirements and Expectations

In addition to MD and PhD curricular requirements, The University of Chicago MSTP involves program requirements that span select or all years of students' training. Such requirements are driven by key learning outcomes set by the program in addition to requirements as recommended by the NIH and/or other MSTPs nationally. Students will be kept up-to-date on any/all details regarding requirements.

The MSTP reserves the right to adjust or add to the requirements and expectations below and will inform students in a timely manner of any such changes.

MSTP New Student Orientation

All incoming year-one MSTP students are required to participate in MSTP New Student Orientation programming when they first arrive and throughout the first summer. Topics may include:

- Overview of the MSTP
- Living in Hyde Park
- Student Funding Aid
- Research and Curricular Topics in Specializations

In addition to MSTP-specific orientation, incoming MSTP students must participate in PSOM's new student orientation. Historically, Pritzker's orientation spans approximately one week and is held in early August each year. In addition to the required MSTP and Pritzker orientations, new students are highly encouraged to attend the BSD orientation in either their first or second year of the program. Typically, the BSD orientation is held in mid-September annually over the course of approximately three days.

Annual All-Program Retreat

All MSTP students in all years are required to participate in an annual all-program retreat. Retreat dates are announced 1-2 years in advance, and absences are granted on a case-by-case basis only. The Retreat will span no more than 2.5 days and is held at the end of June each year. The Retreat location rotates between a local and out-of-city location. The overall purpose of the Retreat is to bond with peers, network with faculty and alumni, share ongoing research in the MSTP community, and gain new knowledge related to students' career path. Additional relevant details will be communicated to students in advance of each Retreat.

Monthly Grand Rounds

All MSTP students in all years are required to participate in monthly MSTP Grand Rounds held September through May annually. Should students be unable to attend in-person, a virtual attendance option will be provided. Grand Rounds involves two MSTP student presents who discuss a clinical case and relevant basic science. In addition to the student presenters, a guest faculty member is in attendance to provide expert input on the selected case. A common feature among MD/PhD programs nationally, Grand Rounds assists students in ongoing connections between clinical cases and basic science research.

Advising

All MSTP students will engage in periodic advising relative to key programmatic milestones. Group and individual advising will be scheduled with students by the MSTP Assistant Director of Admissions and

Student Affairs and the MSTP Faculty Associate Director of Curriculum. In addition to required advising, all students may schedule an advising appointment with any member of the MSTP staff or faculty on a rolling basis.

Required advising (examples; non-exhaustive):

- M1 year—Specialization and graduate coursework selection (autumn); graduate coursework and laboratory rotation selection (winter quarter); preliminary exam and 1-4-3/2-4-2 discussion (spring quarter)
- G1 year—Progress check-in (autumn quarter); F30 overview (winter quarter); committee formation and qualifying exam discussion (spring/summer quarter)
- G2—Qualifying exam check-in (autumn quarter); progress check-in (winter quarter)
- G3+—Progress check-in (autumn quarter); Return to Pritzker session (winter quarter prior to planned return to medical school)
- M2-M3—As needed
- M4—Residency application check-in (summer quarter)

Annual Report and Individual Development Plan

Each Autumn Quarter, all MSTP students are required to complete an Individual Development Plan (IDP). The IDP is administered online and is a requirement of all PhD students within the BSD, though the MSTP has a unique version. The IDP requires students to consider the previous year's academic and co-curricular milestones; in addition to setting goals and identifying challenges and opportunities for the upcoming academic year. Following submission of the IDP, students must meet with at least one identified mentor to discuss the content of the IDP. The student is responsible for scheduling this meeting by the communicated deadline (typically by December 31).

Quarterly Grad Registration

All students are required to be enrolled in the appropriate courses and number of units each quarter in all years of their MD or PhD training. For any/all medical school courses, Pritzker's Registrar automatically registers students for required and/or elective courses (M1-4). For any/all graduate courses, registration will require a mix of students' self-registration and the MSTP Assistant Director of Admissions and Student Affairs registering students. All PhD-phase students must self-register for 300 units of courses (usually all comprised of the "research" course, *ISTP 40000)* to maintain full-time student status. Each student will be aware of their registration requirements based on a quarterly email and ongoing communications sent by the MSTP Assistant Director of Admissions and Student Affairs in addition to advising meetings.

Annual Outreach/Service

Both the PSOM and MSTP have a deep commitment to service and outreach to the University, Hyde Park, and Chicago communities. All students are required to complete 10 hours of scientifically- or medically-relevant community service per year, meaning that the service performed should be connected to roles as a scientist or physician-in-training. The MSTP community is one that benefits from your service, so positions that require consistent commitment are also eligible.

This requirement is tracked by Academic Year (July 1-June 30) and students should report hours using the MSTP Community Outreach Report Form to MSTP within 30 days after performing the service.

Students may "bank" additional hours to be applied to their MS3 year. These hours must be performed the year before MS3 and must be reported on the form during the MS3 year as rollover hours. This is only available to M3's. No other hours may be rolled over to the following year.

First-Author Peer-Reviewed Publication of Original Research

One goal of the MSTP is that students leave the program with an independent body of work performed during the PhD phase. To this end, MSTP students are required to publish a first-author manuscript in a peer-reviewed publication before completing the program. A manuscript should be submitted for review before the PhD is completed.

Professionalism

All MSTP students must adhere to Pritzker School of Medicine's stated Student Professionalism guidelines. During the medical school years (M1-4), any lapse in Professionalism will result in Pritzker's Professionalism Concern Process (PCP). During the PhD years (G1-3+), the MSTP will identify an appropriate resolution on a case-by-case basis to resolve any Professionalism lapses. As needed, the MSTP Associate Dean of Students will consult with the MSTP Faculty Director, the Pritzker School of Medicine Dean of Students, and/or the BSD Dean for Graduate Education to resolve Professionalism lapses during the PhD years.

Annual Focus Groups

Annually, students will be invited to participate in annual focus groups to provide feedback regarding their student experience. The purpose of such focus groups is for program improvement in addition to compliance with NIH guidelines for MSTPs.

MS4 Exit Interview

In spring quarter of students' final M4 year of the MSTP, students will be invited to participate in an online survey or in-person (or virtual) exit interview. The purpose of the exit interview is to understand additional dimensions of each graduate's student experience, to gain additional feedback from the student about their experience in the program, and to collect updated contact information to remain in touch as alumni.

Training Grant Reporting Requirements

All MSTP students must please acknowledge the MSTP Training Grant (T32GM007281) as a funding source for any submitted publications and/or presentations. Students should do this even if they are not appointed to the training grant for a given academic year. See *Appendix A* for additional important reporting requirements when/if a manuscript is accepted for publication.

ORCID iD

All students are required to obtain an ORCID iD within the first quarter of their matriculation to the MSTP per university and NIH requirements. ORCID provides a persistent digital identifier (an ORCID iD) that you own and control, and that distinguishes you from every other researcher. You can connect your iD with your professional information — affiliations, grants, publications, peer review, and more. You can use your iD to share your information with other systems, ensuring you get recognition for all your contributions, saving you time and hassle, and reducing the risk of errors.

Student Funding Aid

Students who matriculate to The University of Chicago's MSTP are fully funded for all years of their medical and graduate school training. "Fully funded" entails 100% of tuition costs, the University student services fee, University health insurance (exclusive of vision or dental coverage), disability insurance (medical school requirement), and an annual stipend in accordance with the rate for all BSD PhD students set by the University. To be eligible for student aid as outlined below, students must be in good standing with the MSTP and University and remain continuously enrolled as a full-time student.

Tuition and Fees

Students who matriculate to The University of Chicago's MSTP receive funding up to the cost of the financial year's tuition level as set by the BSD and Pritzker School of Medicine. The MSTP also covers the University's graduate student services fee, fees related to required courses, and disability insurance for future-physicians for all quarters in which a student is enrolled full-time and in good standing with the MSTP and University.

Stipend

All MSTP students who are enrolled full-time and in good standing with the MSTP and University are eligible to receive an annual stipend in the amount set by the Biological Sciences Division for PhD students. Students will receive this annualized stipend on a monthly schedule on the last business day of each month. In select cases, students will receive a stipend "supplement" for merit-based reasons such as a named endowed fellowship or a F30/31 award. These awardees will be contacted on a case-by-case basis.

If a student receives another award that provides stipend or tuition, the award will replace funds from the MSTP and is not additive.

University Health Insurance (U-SHIP)

U-SHIP enrollment is required for all enrolled PhD students and are paid for PhD students with University funds or with grant funds, as allowed by grant terms as required fees. MSTP will fund the cost of U-SHIP for all full-time students pending good academic standing. Students are responsible for paying their own premiums for dependents, or for vision or dental insurance.

Vision, dental, or any insurance for dependents, is optional. These costs are the full responsibility of the student and must be paid via the Bursar.

Other Student Financial Support

Ragins M4 Residency Scholarship/MSTP Professional Development Fund

All MSTP students who are in good standing with the MSTP and university and are continuously enrolled as a full-time student are eligible to earn to $500 per academic year up to a maximum total of $3,500. These monies serve as a 'professional development fund'. Historically, this fund is saved by students until their M4 year to be used for residency application and travel expenses. Students earn these funds by participating in the program requirements outlined in this section. If/when a student receives an

unexcused absence from one or more events, this may be subject to a deduction in the $500 maximum accrual/year.

Training Related Expenses from the MSTP Training Grant

In years where a student is appointed to the MSTP's NIH T32 training grant, students are eligible to make training related purchases up to $250 (M1 and M2s) or $600 (M3 and M4s)

Appendix A: Publication Guidelines

Preparing a manuscript:

MSTP students are expected to have submitted a first-author publication by the completion of their PhD (in press preferred).

Submitting a manuscript:

The MSTP Training Grants should be acknowledged on any paper that results from research at the University of Chicago, regardless of whether you were appointed in any particular year. For work completed before June 30, 2023, acknowledge T32GM007281. For work completed or published after July 1, 2023, acknowledge T32GM150375. For work that spans both time periods, please include both grant numbers.

Publishing a manuscript:

The NIH Public Access Policy requires all peer-reviewed papers resulting from NIH funding be submitted to PubMed Central.

- If a student is a first or second author, the student is responsible for making sure that the manuscript is submitted to PubMed Central so that it can be assigned a PMCID number.
- Check with the publication about their PubMed submission policy.
- Some journals submit all manuscripts themselves automatically. If your publication is on the "Method A" list, you should make sure that the publisher knows that your paper is subject to the NIH Public Access Policy.
- If the publication does not submit using "Method A", the student will use "Method C" to submit the manuscript.
- Note: Any author can submit a manuscript, so the MSTP strongly suggests students do so even if/when they are not the first author. If students do not have access to the final, peer-reviewed manuscript, please discuss with the first author and/or the PI to ensure that the submission is in process.
- Students will log in to the NIHMS website using your eRA Commons account to submit.
    - Continue to check the status of the submission via the website until the PMCID is assigned. If there is a problem, or the PMCID has not been issued within three months of submission, please let us know.

Appendix B: When Do I…?

M1/MSTP1	attend MSTP retreat?	June annually
	start medical school?	June, 1st week of Summer quarter
	learn about PhD specializations/classes?	Summer quarter before M1
	participate in MS1 MD orientation?	August
	start grad classes?	Autumn
	participate in MSTP Grand Rounds?	monthly, throughout all years
	participate in MSTP journal club?	each quarter of first year, including Summer
	declare my PhD specialization?	start of Autumn quarter
	set up summer lab rotations?	no earlier than Spring quarter
	take prelims?	Spring or Summer qtr; depends on specialization
	take MSTP Biostats journal club?	Summer quarter after M1
	do rotations?	Summer quarter after M1
G1/MSTP2	attend qBio bootcamp?	September
	join a lab?	start of Autumn quarter
	defend proposal/quals?	Spring or Summer qtr (**No later** than end Dec G2)
	meet with my committee?	every 6-9 months after qual exam
	complete BSD RCR?	Autumn and winter quarter (as per OGPA)
G2/MSTP3	complete TAships?	sometime in G2-G4 (but not last qtr G4)
	begin to be supported on my advisor's funds?	Summer quarter after G2
	submit F30?	6-9 months after quals
G3/MSTP4	complete TAships?	sometime in G2-G4 (but not last qtr G4)
	resubmit F30?	4-8 months after 1st submission, if necessary
	prepare a 1st author manuscript for publication?	sometime in G3-G4
G4/MSTP5*	complete TAships?	sometime in G2-G4 (but not last qtr G4)
	prepare a 1st author manuscript for publication?	sometime in G3-G4
	write up my dissertation?	Autumn and Winter quarter
	prepare for transition back to PSOM? Incl material for new PSOM curriculum	Spring or Summer quarter
	complete advanced ethics with your BSD cluster?	Winter or Spring quarter
	have a penultimate committee meeting?	Winter quarter
	defend dissertation and graduate with my PhD?	Spring or Summer quarter (ie. diss submitted by wk4)
	petition to CAP to return to PSOM M2?	by July 1
**If following a 2-4-2: G4 year*	*Participate in the clinical refresher?*	*TBD depending on PSOM new curriculum*
	Defend and deposit dissertation?	*Spring quarter*
	Return to M3?	*TBD depending on PSOM new curriculum*
M2	return to M2?	TBD depending on PSOM new curriculum
	study for and take USMLE Step 1 exam?	by April 30ish
	Complete a 3rd rotation (only if necessary in 2-4-2)?	*May-June*
M3	begin M3 and clinical rotations?	TBD depending on PSOM new curriculum
	study for and take USMLE Step 2 ck exam?	Spring/Summer quarter
M4	begin M4?	TBD depending on PSOM new curriculum
	apply and interview for residencies?	Summer - Autumn quarter
	take MSTP M4 coursework?	Winter quarter
	graduate with my MD!	Spring quarter

Appendix C: Specialization Curricula

Biochemistry and Molecular Biology (BMB) Specialization for ISTP Students *Last updated 2022
Graduate Program Director: Joseph Piccirilli **Graduate Program Administrator:** Shani Charles

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
A total of 3 graduate courses are required for the specialization: *3 programmatic courses (3 in **red**, 1 of 2 in **blue**) and 1 elective (in **black**)* *Red = required* *Blue= one of the two are required, the other can be used as an elective.* *Black = electives* *A total of 3-5 courses should be taken during the* MS1/ISTP1 *year, and 0-2 taken in GS1/ISTP2 year.*	*BCMB 30400 –Protein Fundamentals Özkan, E, Arac- Özkan, D.and Piccirilli, J. TTh 1:30 PM-2:50 PM Potential Elective: BCMB 30600 – Nucleic Acid Structure & Function Rice, P.; Pan T, MW 1:30 PM-2:50 PM CHEM 33200 –Chemical Biology I Dickinson, Bryan MWF 8:30-9:20 AM	Potential elective courses: * BCMB / 32300 - 01 Structure and Function of Membrane Proteins, Perozo E,. 12:00p-1:30p BCMB 31100 – Evolution of Biological Molecules Drummond, Allan; Thornton, Joe TTH 10:30 AM-11:50 AM BCMB 32800 – Intro to Data Science in Biochemistry Rock Jr Ronald MW 1:30 PM-2:50 PM CHEM 33300 – Chemical Biology II Mollering, Ray MWF 9:30-10:20 CHEM 33700 RNA Special Topic Course Piccirilli, J. MWF 10:30AM-11:20AM	BCMB 32200 Biophysics of Biomolecules Sosnick, Tobin R TTh 3:30p-4:50pm Potential elective courses: CHEM 30900 – Bioinorganic Chemistry He, Chuan TTH 11:00AM-12:20PM	Proposal Writing Workshop/BMB Prelim Exam Rotations
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	The Human Body
Activities include all aspects of the BMB program first year	Biosciences Cluster Annual Retreat Prepare NSF GRFP proposal (for training purposes). Introduction to Research "All Stars" 12:00p-1:30p.m. TTH			

Biophysical Sciences (BIOPHYS) Specialization for ISTP Students *Last updated 2023
Graduate Program Director: Adam Hammond **Graduate Program Administrator:** Michele Wittels

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *~3 BSD courses in year 1in **red** for the specialization*	BSD didactic course Schedule meeting with Adam Hammond once BPHYS specialization is selected	BSD didactic course	BSD didactic course Declare BPHYS specialization by April 15th and meet with Adam Hammond	Biological Research Immersion (BRI – "1st "qtr" of the lab course") Begin mid- August for 5 weeks.
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio. Carrillo, Mukherjee, Pincus. TBD	ISTP 30440 Journal Club: Physiology. Weber. TBD	ISTP 30441 Journal Club: Grantsmanship TBD Clark	ISTP 30460 Journal Club: Statistics TBD
YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Programmatic Courses: *At least 3 PSD courses in year 2 in **red** for the specialization*	PSD didactic courses (refer to BPHYS handbook for courses that fulfill this requirement) BPHS 35001 Synthesis & Modification- I (2nd qtr of lab course, minimum 20 hrs/wk)	PSD didactic courses BPHS 35002 Synthesis & Modification- II (3rd qtr of lab course, minimum 20 hrs/wk)	PSD didactic courses or Molecular Biophysics course if not taken in year 1	
Research:		Rotations	Rotations or start PhD research	
Activities include all aspects of the BPHS program first year	Biosciences Cluster Annual Retreat Prepare NSF GRFP proposal (for training purposes).	Biophysical Society National Meeting		Research in Progress BPHYS bi-annual retreat (Late August)
YEAR GS2/ISTP3	Autum	Winter	Spring	Summer
	Qualifying exam			

Molecular Biophysics Course Requirement
One elective course must be from this list of molecular biophysics courses. Some of these courses are not offered every year.
1) Biophysics of Biomolecules* (BPHS 31000)
2) Simulation, Modeling, and Computation in Biophysics (BCMB 31358)
3) Biophysics of Membrane Proteins (BCMC 32300)
4) Biophysical Chemistry* (CHEM 38700)
* These two courses have very similar content, and thus, they can't both be taken for credit.

Note: the BIOPHYS program is not compatible with 2-4-2 sequence.
Students will have chosen their BSD mentor by the start of The Lab course and their PSD mentor by May 15 of Year ISTP2
There is no Preliminary Exam for the Biophysical Sciences specialization
Qualifying exams will be taken no later than Fall Quarter of Year ISTP3

Cancer Biology (CCB) Specialization for ISTP Students *Last updated 2022

Graduate Program Director: Steve Kron **Graduate Program Administrator:** Laura Negrete

Specialization Courses:

Total Number of Core Courses Required to Fulfill Specialization for the ISTP Degree: 6

- CABI 30800 CanBio 1: Fundamentals in Cancer Biology MWF 9:00am-10:20am (Autumn)
- CABI 32000 CanBio 3: Translational Approaches in Cancer Research WF 9:30 am – 10:50 am (Spring)
- CABI 31600 CanBio 4: Hypothesis Design and Grant Writing Skills TTh 2:00pm-3:20pm (Autumn, 2nd year students)
- CABI 39000 CanBio 5: Introduction to Experimental Cancer Biology T 9:30am-10:50am (Winter)
- CABI 39900 Readings: Cancer Biology By arrangement (Autumn, Winter, Spring)
- CABI 31000 BMSC All Stars T 12:30pm-1:50pm (Autumn/Winter)

Total Number of Elective Courses Required to Fulfill Specialization for the ISTP Degree: 2

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *3 required courses in red for the specialization (A total of 3-5 graduate courses will be taken during the* MS1 *yr)*	CABI 30800 Cancer Bio-1: Fundamentals in Cancer Biology Lingen, MWF 9:00am-10:20am CABI 39900 Readings: Cancer Biology CCB Faculty CABI 31000 BMSC All Stars T 12:30pm-1:50pm CCB Faculty	CABI 39000 Introduction to Experimental Cancer Biology Rosner, M T 9:30am-10:50am CABI 31000 BMSC All Stars T 12:30pm-1:50pm CCB Faculty	CABI 39900 Readings: Cancer Biology CCB Faculty	Rotations
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	
CCB Activities	Seminars -Fridays CCB Weekly Mondays 4:00-5:00pm			
Preliminary Exam:	Mid-late June of first year			

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Courses:	CABI 31600 Hypothesis Design & Grant Writing Skills TTh 2:00pm-3:20pm Izumenchenko, E; Bader, K; Basu, A	CABI 39000 Introduction to Experimental Cancer Biology Rosner, M T 9:30am-10:50am	CABI 32000 Translational Approaches in Cancer Biology Kay Macleod WF 9:30 am – 10:50 am TBD	
Research:	Start PhD Research			
CCB Activities	Seminars -Fridays CCB Weekly Mondays 4:00-5:00pm			
Qualifying Exam	Summer-By end of Autumn Quarter of third year			

Cell and Molecular Biology (CMB) Specialization for ISTP Students *Last Updated 2018
Graduate Program Director: David Kovar **Graduate Program Administrator:** Shani Charles

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *At least 3 courses for the specialization Red = required (A total of 3-5 graduate courses will be taken during the MS1 year)*	MGCB/ 31400 Genetic Analysis of Model Organisms Bishop D et al; I MWF 1:30PM-2:50Pm and DIS TH 7:00PM-8:20PM	MGCB / 31700 Cell Biology II Glotzer M; Kovar D MWF 1:30PM-2:50PM	MGCB / 31300 Molecular Biology-2 Staley J; Ruthenburg A; MW 3:00PM- 4:20PM Fri Discussion 12:30PM-2:20PM	Rotations
Elective Courses: A total of 2 electives. *Electives should be used to fill in knowledge gaps*	Above courses or additional courses approved by Program Chair and MSTP Possible Courses that work for MS1/ISTP1 schedule: BCMB / 30600 - 01 Nucleic Acid Structure Rice P; Pan T; MW 1:30PM-2:50PM	Above courses or additional courses approved by Program Chair and MSTP Possible Courses that work for MS1/ISTP1 schedule:	Above courses or additional courses approved by Program Chair and MSTP Possible Courses that work for MS1/ISTP1 schedule: BCMB / 30800 - 01 Single Molecule Biochemistry Rock R MW 1:30PM-2:50PM	
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio Horne-Badovinac, McNerney, and Heckscher, MW 5-6:20 p.m.	ISTP 30440 Journal Club: Physiology Weber, Chris and Hofmann-Bowman, Marion. MW 5-6:20 p.m.	ISTP 30441 Journal Club: Grantsmanship MW TBD Clark, Marcus	ISTP 30460 Journal Club: Statistics Anastasio, Alison TBD

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Courses:	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed
Research:	Start PhD Research			
CMB specific activities	Students will participate for 1 year in the "Genetics of Model Organisms Club". This runs through fall, winter and spring. Every two weeks, a student and PI focus on a recent paper. On alternate weeks, two students or postdocs present 20-30 presentations on their research. Students may participate in a different journal/data club with the approval of the ISTP Curriculum Chair and the CMB Program Director (e.g, the Molecular and Cellular Biology Research-in-Progress series).			
Preliminary Exam:	Summer prior to joining a lab			
Thesis Proposal/ Qualifying Exam	By end of Winter Quarter			

Chemistry & Chemical Biology Specializations for ISTP Students *Last updated 2020
Graduate Program Director: Vera Dragisich **Graduate Program Administrator:** Melinda Moore

YEAR GS1/MS1	Autumn	Winter	Spring	Summer
Specialization courses: **3 required courses (in red)** CHEM 33200 and CHEM 33300 and choose between CHEM 32100 CHEM 32200	CHEM 33200/Chemical Biology I Tang, W. MWF 8:30AM-9:20AM CHEM 32100/Physical Organic Chemistry Levin, M. 32200/Organic Synthesis & Structure Rawal, V. TTH 11:00AM- 12:20PM	CHEM 33300/Chemical Biology II Moellering, R. MWF 9:30AM-10:20AM		Rotations
3 elective courses can be any graduate (300-level) courses in departments of Chemistry, Biochemistry & Molecular Biology, etc.		Etc.	Etc.	
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	The Human Body (1st half of Summer 2021)

YEAR GS2	Autumn	Winter	Spring	Summer
Specialization Courses:	Additional coursework as necessary	Additional coursework as necessary	Additional coursework as necessary	
Preliminary Exam:	Three basic, multiple-choice exams in Organic, Physical and Inorganic Chemistry in September with the other incoming Chemistry graduate students.			
Specialization-specific activities:	Seminar series Annual retreat Work in Progress Journal Club Advising Etc.			

Development, Regeneration and Stem Cell Biology Specialization for ISTP Students *Last Updated 2018
Graduate Program Director: Ilaria Rebay **Graduate Program Administrator:** Shani Charles

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Course Requirements for DRSB: One course in each of three areas: Genetics – GAMO Mol. Biol. – I or II Cell Biol. – I or II Three courses in Developmental Biology + One Elective *Red = required during first ISTP year if possible* *(A total of 3-5 of graduate courses will be taken during the* MS1/ISTP1 *year)*	MGCB 31400 Genetic Analysis of Model Organisms *Instructors: Bishop. Ferguson, Lee, Moskowitz* MWF 1:30-2:50PM MGCB 31600 Cell Biology I *Instructors: Glick, Turkewitz* MWF 10:30AM-12:20PM (if not taking Cell Biol II)	DVBI 36400 Developmental Mechanisms *Instructors: Ferguson, Febon* TTh 11:00AM-12:20PM MGCB 31700 Cell Biology II *Instructors: Glotzer, Kovar* MWF 1:30PM-2:50PM (if not taking Cell Biol I) MGCB 31200 Molecular Biology I *Instructor: Rothman-Denes* TTh 2:00-3:20PM (if not taking Mol Biol II)	DVBI 32000 Quantitative Analysis of Biological Dynamics *Instructors: Munro, Rust* TTh 2:00-3:20PM MGCB 31300 Molecular Biology II *Instructors: Ruthenburg, Staley* MW 3:00-4:20PM (if not taking Mol Biol I)	Rotations
Elective Courses: Above courses or additional courses approved by Program Chair and MSTP	DVBI 33850 Evolution and Development *Instructor: Schmidt-Ott* MW 10:30AM-12:20PM	DVBI 32300 Molecular Principles of Nervous System Development *Instructors: Grove, Kratsios* MWF 9:30-10:20AM	DVBI 35600 Vertebrate Development *Instructors: Prince, Ragsdale* TTh 11:00AM-12:20PM	
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio McNerney, Heckscher, Carillo TBD	ISTP 30440 Journal Club: Physiology Weber, & Ritterhouse TBD	ISTP 30441 Journal Club: Grantsmanship MW TBD Clark	ISTP 30460 Journal Club: Statistics McCannTBD
YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Courses:	DVBI 36200 Stem Cells and Regeneration *Instructors: Ferguson, Prince, de Jong, Wu, Duan* MW 4:30-5:50PM	Note: any requirements not taken in ISTP1 may be taken in ISTP2		
Research:	Start PhD Research			
DRSB Specific activities:	• DRSB Seminar - 3rd Tues each month 4PM. • DRSB Journal Club/Research Presentations – Every two weeks Monday 12PM. The format alternates between a presentation of a recent paper by a student, and two 20-30 minute presentations by students/postdocs on their research. Students may participate in a different JC course with the approval of the ISTP Curriculum Chair and the DRSB Program Director. • Molecular Biosciences Retreat – a Friday/Sat in early November.			
Preliminary Exam:	Prelim Occurs just after the end of the Spring Quarter of the GS1/ISTP2 year			
Thesis Proposal/Qualifying Exam: Thesis Proposal Defense/1st Committee meeting Fall GS2/ISTP3 year				

Ecology and Evolution (ECEV) Specialization for ISTP Students *Last updated 2020
Graduate Program Director: Stefano Allesina **Graduate Program Administrator:** Audrey Aronowsky

YEAR MS1/ISTP1	Autumn	Winter – NOT CONFIRMED. EXPECT CHANGES	Spring – NOT CONFIRMED. EXPECT CHANGES.	Summer
Course Requirements for ECEV: **3 required courses**: 3 ECEV courses excluding Directed Reading ECEV 49600 n.b. Distribution requirements must be fulfilled: 2 courses in Ecology and 1 in Evolution **OR** 2 courses in Evolution and 1 in Ecology	**ECEV 42600** / Wootton (Ec) Community Ecology, Fri 2:30- 4:20PM **ECEV 35901** / Long and Wu (Ev) Genomic Evolution, Thu 9:30AM-12:20PM **ECEV 36400** Molecular Phylogenetics 2:00-3:20 T/Th in GCIS W301 STAT 24400 Statistical Theory/Method-1 Barber TTR 3:30PM-4:50PM CMSC 12100 Computer Science with Applications Black MWF 9:30AM-10:20AM	**ECEV31100** / Thornton, Drummond (Ev) Evolution of Biological Molecules, ARR **ECEV 42800** / Pfister (Ec) Population Ecology,ARR **ECEV 42900** / Dwyer and Cobey (Ec) Theoretical Ecology, ARR **ECEV 35600** / Kreitman and Steinrucken Population Genetics I, ARR STAT 24500 Statistical Theory/Method-2 Gao, TTR 9:00AM-10:20AM	**ECEV 34500** / Kronforst (Ev) Advanced Topics in Evolutionary Biology TR 2:00p-3:20p **ECEV 44500** Mercedes Pascual Networks in Ecology & Evolution **ECEV 37500** Steve Pruett-Jones Sexual Selection	**Rotations, research, field work**
ISTP Required Courses:	ISTP 30420 Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	The Human Body (1st Half of Summer 2021)

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Courses:	Complete coursework	Complete coursework	Complete coursework	
Preliminary/Qualifying Exams:		Oral exam at conclusion of WI GS2 based on 3 ECEV distribution courses	Written thesis proposal and defense during Spring Q of GS2	
Research:	PhD Research	PhD Research	PhD Research	PhD Research
ECEV Specific activities:	ECEV Seminar - Every other Monday 3:30-4:30 in KCBD 1103 Darwin's Weekly seminar – Every Tuesday 12-1pm in Zoology 212 (Lillie Room) Darwinian Sciences retreat – September Quarterly meeting with Student Advisory Committee in GS1/GS2 2-4 Session required Anti-Bias Training/Workshop in Autumn Quarter -			

Genetics, Genomics, and Systems Biology (GGSB) Specialization for ISTP Students *Last updated 2020
Graduate Program Director: Marcelo Nobrega **Graduate Program Administrator:** Sue Levinson

YEAR GS1/MS1	Autumn	Winter	Spring	Summer
4 programmatic courses (in red) and 1 elective for a total of 5 graduate courses are taken for the specialization Red = required *A total of 3-5 courses should be taken during the MS1/GS1 year, and 0-2 taken in GS2 year.*	HGEN 31400-01 Genetic Analysis of Model Organisms MWF 1:30-2:50 PM TH DIS 7:00PM-8:20PM Elective alternative classes: HGEN 47000-01 Human Genetics I Nobrega, Ober and Waggoner MWF 10:30-11:50 AM MGCB 31600-01 Cell Biology I Glick, Turkewitz MWF 10:30-11:50 AM	ECEV 35600-01 Principles of Population Genetics ARR Elective alternative classes TBA	MGCB 31300-01 Molecular Biology 2 Staley, J. MW 3-4:20PM PM F 12:30-2:20 PM Elective alternative classes TBA	Rotations
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	The Human Body (1st half of Summer 2021)

YEAR GS2	Autumn	Winter	Spring	Summer
Courses:	Fill in courses as needed	Fill in courses as needed	Genomics and Systems Biology	Fill in courses as needed
Research:	Start PhD Research			
GGSB specific activities	Faculty Research Seminar Series /All Stars (GENE 31900) Genetics Seminar Series Genetics Journal Club Genetics of Model Organisms Club GGSB Annual Symposium Molecular Biosciences Retreat (November)			
Preliminary Exam:	September after rotations Select 3 of 10 questions.			
Qualifying Exam	Completed by end of Winter Quarter			

GENE	**31800**	**Current Topics in Genetics**	**Autumn 2020**

GGSB hosts invited seminar speakers on Tuesday, at 4pm in the Autumn, Winter and Spring quarters. We are still finalizing the seminar schedule and will send to everyone soon.

This is a required course for all GGSB students.

Immunology (COI) Specialization for ISTP Students *Last updated 2023
Graduate Program Director: Pete Savage **Graduate Program Administrator:** Beth Morrissey

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *2 required courses in purple for the **Classic** & **CSI** tracks specialization*		IMMU 31500 Advanced Immunology TTh 3:30-4:50 pm	IMMU 32000 Molecular Mechanisms of Immune Cell TTh 3:30p-4:50pm	Rotations Attend AAI Prelim
Programmatic Courses: *2 **additional** required courses in blue for the **CSI** track specialization*	IMMU 48000 Immunogenomics I TTh 5:00-6:20 pm			
Elective Courses: *Classical track requires 2 Immunology & 1 basic science CSI track requires 1 Immunology or 1 basic science*	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed	
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio. Carrillo, Mukherjee, Pincus. TBD	ISTP 30440 Journal Club: Physiology. Weber. TBD	ISTP 30441 Journal Club: Grantsmanship TBD Clark	ISTP 30460 Journal Club: Statistics TBD

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Programmatic Courses:		IMMU 48900 Immunogenomics II TTh 9:30-10:50	Qualifying exam	
Elective Courses: *Remaining electives*	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed	
Courses:	All year IMMU 40200 Intro to Exp Immunology			
Research:	Start PhD Research			
COI Activities	Monday Seminars at 12 pm Wednesday 3 pm Work-in-Progress (ISTP Students will present research once annually) Friday 9 am Journal Club (ISTP Students will present a paper once annually) Annual Retreat in Spring			

Medical Physics Specialization for ISTP Students *Last updated 2018
Graduate Program Director: Samuel Armato **Graduate Program Administrator:** Maya Suraj

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *Minimum 5 courses required for the specialization*	MPHY 35000 Interactions of Radiation with Matter	MPHY 35100 Physics of Radiation Therapy	MPHY 38600 Physics of Medical Imaging-1	MPHY 38700 Physics of Medical Imaging-2 Rotations
ISTP Requirements:	ISTP Journal Club	ISTP Journal Club	ISTP Journal Club	The Human Body
YEAR GS1/ISTP 2				
Courses	Select TWO additional courses approved by the dissertation advisor			
Research	Start dissertation research			
Medical Physics-specific activities	Weekly journal club Bimonthly visiting speaker seminar Quarterly Career Development Seminar Series Biennial retreat			
Preliminary Exam	For the Comprehensive Exam, Medical Physics faculty will grade for the ISTP specialization in Medical Physics not for a Ph.D. in Medical Physics			
Thesis Proposal	By the end of the Spring Quarter			

Microbiology (COM) Specialization for ISTP Students *Last updated 2018

Graduate Program Director: Glenn Randall **Graduate Program Administrator:** Natasha Beals

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *3 required courses in red for the specialization* *(A total of 3-5 graduate courses will be taken during the MS1 year)*	MICR (IMMU) 31200 Host-Pathogen Interactions Chervonsky TTh 4:00PM-5:20PM DIS T 3:00PM – 3:50PM MICR 30600 Fundamentals of Bacterial Physiology Missiakas TTh 11:20AM-12:40PM DIS F 10:20AM – 11:10 AM & 11:30APM-12:20PM		MICR 34600 Intro to Virology Golovkina MF 1:30PM-2:50PM DIS W 1:30pm-2:20PM	Rotations
Elective Courses: A total of 2 electives. *Electives should be used to fill in knowledge gaps* Above courses or additional courses approved by Program Chair and MSTP	BCMB / 31400 - 01 Genetic Analysis of Model Organisms Bishop MWF Lec 1:30PM- 2:50PM Fri Disc 7:00PM-8:20PM BCMB / 30600 - 01 Nucleic Acid Structure Rice P; Pan T MW 1:30PM-2:50PM Cell Biology 1 (Glick/Turkewitz)	BCMB / 32300 - 01 Structure and Function of Membrane Proteins, Perozo E, 12:00PM-1:30PM BCMB / 31700 - 01 Cell Biology II Glotzer M ; Kovar R MWF 1:30PM-2:50PM IMMU 31500 Advanced Immunology I Bendelac TTH 3:30PM-4:50PM. Molecular Biology 1 (Rothman-Denes)	BCMB / 31300 - 01 Molecular Biology-2 Staley J MW Lec 3- 4:20pm Fri Disc 12:30- 2:20PM BCMB / 30800 - 01 Single Molecule Biochemistry Rock R MW 1:30PM-2:50PM IMMU 32000 Advanced Immunology II TTh 3:30PM-4:50PM	
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio	ISTP 30440 Journal Club: Physiology	ISTP 30441 Journal Club: Grantsmanship	

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Courses:	Fill in courses as needed Students will participate for 1 year in the Intro to Experimental Microbiology and Data Club	Fill in courses as needed Students will participate for 1 year in the Intro to Experimental Microbiology and Data Club	Fill in courses as needed Students will participate for 1 year in the Intro to Experimental Microbiology and Data Club	Fill in courses as needed
Research:	Start PhD Research			
COM Activities	Wednesday Seminars Friday COM Research Forum Bi-Annual Retreat			
Preliminary Exam:	Between July and September of the student's first year			
Qualifying Exam	By end of Spring Quarter			

Specialization Courses: *3 Microbiology programmatic courses* (Host-Pathogen Interactions, Bacterial Pathogenesis, Virology); *2 Core Basic Science Elective courses* (Genetics – Autumn Quarter, Membranes or Cell Bio II – Winter Quarter, Mol Bio II - Spring Quarter, or another course approved by Program Director); *1 year of Graduate Student Journal Club* (Intro to Experimental Microbiology).

Molecular Engineering Specialization for ISTP Students *Last Updated 2023
Graduate Program Director: Jun Huang **Graduate Program Administrator:** Alicia Bearden-Mannie

A total of 5 graduate courses are required for the Molecular Engineering specialization: 3 PME core courses and 2 in- depth courses (all selected in consultation with the PME advisor/ mentor).

YEAR GS1/MS1	Autumn	Winter	Spring	Summer
Elective Courses: A total of 2 electives.	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed	At least one 5-week rotation with an IME research advisor (ideally two).
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio. Carrillo, Mukherjee, Pincus. TBD	ISTP 30440 Journal Club: Physiology. Weber. TBD	ISTP 30441 Journal Club: Grantsmanship. TBD Clark	ISTP 30460 Journal Club: Statistics. TBD

YEAR GS2	Autumn	Winter	Spring	Summer
Programmatic Courses: *3 required courses in purple for the* ***Immunoengineering*** *track specialization* Choose MENG 33130 or MENG 33110	MENG 33100 Biological Materials. Guler, Hubbell MW 1:30-2:50 MENG 33200 Principles of Immunology. Nagler TTh 2:00-3:20 lect, F 9:30-10:20 disc MENG 33130 Proteom and Genom in Biomolec Engin. Mendoza, Riesenfeld. T/Th 11:00-12:20, W 9:30-10:20 disc	MENG 33110 Stem Cell Biology, Regen, and Disease. Chen TTh 11:00-12:20		Candidacy exam
Programmatic Courses: *3 required courses in blue for the* ***Quantum Sci*** *track specialization*	MENG 31400 Advanced Quantum Engineering MW 1:30-2:50 lect, F 1:30 PM-02:20 disc PHYS 34100 Graduate Quantum Mechanics-1 TTh 11-12:20	PHYS 34200 Graduate Quantum Mechanics-2 TTh 11-12:20		
Programmatic Courses: *3 required courses in green for the* ***Materials Systems*** *track specialization*				

Additional info/detail: Dual advising required – 1 PME & MSTP
Note there is no PME prelim, it is wrapped into the candidacy exam

Neurosciences Specialization for ISTP Students *Last Updated 2023

Graduate Program Director: Dan McGehee (Neurobio) **Graduate Program Administrator:** Elena Rizzo
Brent Doiron (Comp Neuro)

Requirements for all students (comp or not comp)

Computational track has additional requirements not listed here.

YEAR MS1/ISTP1	Autumn	Winter	Spring	Summer
Programmatic Courses: *3 required courses in red for the specialization*	NURB 31600 Survey of Systems Neuroscience Oswald MW 3:00-4:20 pm lect Th 2:00-3:20 pm disc	NURB 31800 Cellular Neurobiology McGehee, Eatock, Zhuang, MW 3:00-4:20 pm lect F 3:00-4:20 disc	NURB 30107 Behavioral Neuroscience Margoliash MW 3:00-4:20 pm	Rotations
	NURB 32000 Intro to Faculty Research (All Stars) W 11:45-1:15			
ISTP Required Courses:	ISTP 30420. Journal Club: Cell & Dev Bio. Carrillo, Mukherjee, Pincus. TBD	ISTP 30440 Journal Club: Physiology. Weber. TBD	ISTP 30441 Journal Club: Grantsmanship. TBD Clark	ISTP 30460 Journal Club: Statistics. TBD

YEAR GS1/ISTP2	Autumn	Winter	Spring	Summer
Elective Courses: 2 required. *Electives should be used to fill in knowledge gaps*	Fill in courses as needed	Fill in courses as needed	Fill in courses as needed	
Research:	Start PhD Research			
Prelim Exam:	None			
Thesis Proposal/ Qualifying Exam	By end of Spring Quarter			

Public Health Sciences (Biostatistics) Specialization for ISTP Students *Last updated 2020
Graduate Program Director: Brandon Pierce **Graduate Program Administrator:** Michele Thompson

YEAR MS1/ISTP1	Autumn 2020	Winter 2021	Spring 2021	Summer 2021
Specialization courses:			**PBHS 35100 Health Services Research Methods- P. Sanghavi; M/W 1:30-2:50pm (contingent on schedule)**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	
ISTP requirements:	**ISTP 30420 -** Journal Club: Cell/Dev Biology	**ISTP 30440 -** Journal Club: Physiology	**ISTP 30441 -** Journal Club: Grantsmanship	**Rotation 1** **Rotation 2**

YEAR GS1/ISTP2	Autumn 2021	Winter 2022	Spring 2022	Summer 2022
Specialization courses:	**STAT 34300 Applied Linear Statistical Methods** **STAT 30400 Distribution Theory** **PBHS 30910 Epidemiology and Population Health**	**PBHS 31001 Epidemiologic Methods** **STAT 30100 Mathematical Statistics 1** **PBHS 32901 Introduction to Clinical Trials** **BSDG 55000 Scientific Integrity and the Ethical Conduct of Research**	**STAT 34700 Generalized Linear Models** **STAT 30200 Mathematical Statistics II** **PBHS 35500 Introduction to U.S. Health Policy and Politics**	
Preliminary Exam:	*September*			
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	
ISTP milestones:	Officially join a lab/select a mentor	Form dissertation committee	Thesis proposal in the form of an F30 and defense (ie. Quals) by end of GS2	

YEAR GS2/ISTP2	Autumn 2022	Winter 2023	Spring 2023	Summer 2023
Specialization courses:	**PBHS 33500 Statistical Applications**	**PBHS 43010 Applied Bayesian Modeling and Inference** **PBHS 43200 Causal Inference**	**PBHS 33300 Applied Longitudinal Data Analysis** **PBHS 43301 Advanced Causal Inference**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	

Public Health Sciences (Epidemiology) Specialization for ISTP Students

Graduate Program Director: Brandon Pierce **Graduate Program Administrator:** Michele Thompson

YEAR MS1/ISTP1	Autumn 2020	Winter 2021	Spring 2021	Summer 2021
Specialization courses:		Possibly STAT 22000 or 23400 (contingent on schedule and interest) OR **PBHS 31200 Cancer Epidemiology B. Chiu; M/W 1:30-2:50pm**	**PBHS 35100 Health Services Research Methods- P. Sanghavi; M/W 1:30-2:50pm (contingent on schedule)**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	
ISTP Required Courses:	**ISTP 30420. Journal Club: Cell & Dev Bio McNerney, Heckscher, Carillo TBD**	**ISTP 30440 Journal Club: Physiology Weber, & Ritterhouse TBD**	**ISTP 30441 Journal Club: Grantsmanship MW TBD Clark**	**ISTP 30460 Journal Club: Statistics McCannTBD**

YEAR GS1/ISTP2	Autumn 2021	Winter 2022	Spring 2022	Summer 2022
Specialization courses:	**PBHS 30910 Epidemiology and Population Health** **PBHS 32100 Introduction to Biostatistics** **HGEN 47000 Human Genetics I**	**PBHS 31001 Epidemiologic Methods** **PBHS 32400 Applied Regression** **HGEN 47100 Human Genetics II** **BSDG 55000 Scientific Integrity and the Ethical Conduct of Research**	**PBHS 32700 Biostatistical Methods** **PBHS 35500 Introduction to U.S. Health Policy and Politics** **PBHS 40500 Advanced Epidemiologic Methods**	
Prelim Exam:	*September*			
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	

YEAR GS2/ISTP2	Autumn 2022	Winter 2023	Spring 2023	Summer 2023
Specialization courses:	**PBHS 33500 Statistical Applications**	**PBHS 32901 Introduction to Clinical Trials;** **PBHS 43201 Causal Inference**	**PBHS 33300 Applied Longitudinal Data Analysis**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	

Public Health Sciences (Health Services Research / Health Economics) Specialization for ISTP Students
Graduate Program Director: Brandon Pierce **Graduate Program Administrator:** Michele Thompson

YEAR MS1/ISTP1	Autumn 2020	Winter 2021	Spring 2021	Summer 2021
Specialization courses:		Possibly STAT 22000 or 22700 (contingent on schedule and interest)	**PBHS 35100 Health Services Research Methods- P. Sanghavi; M/W 1:30-2:50pm (contingent on schedule)**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	
ISTP Required Courses:	**ISTP 30420. Journal Club: Cell & Dev Bio**	**ISTP 30440 Journal Club: Physiology**	**ISTP 30441 Journal Club: Grantsmanship**	**The Human Body**

YEAR GS1/ISTP2	Autumn 2021	Winter 2022	Spring 2022	Summer 2022
Specialization courses:	**PBHS 30910 Epidemiology and Population Health** **PBHS 32100 Introduction to Biostatistics** **PPHA 32310 Advanced Microeconomics for Public Policy I**	**PBHS 32400 Applied Linear Regression (or STAT 244)** **PBHS 31001 Epidemiologic Methods** **PPHA 42000 Applied Econometrics I** **BSDG 55000 Scientific Integrity and the Ethical Conduct of Research**	**PBHS 32700 Biostatistical Methods (or STAT 24500)** **PBHS 35500 Introduction to U.S. Health Policy and Politics** **PPHA 32400 Principles of Microeconomics and Public Policy II**	
Preliminary Exam:	*September*			
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	

YEAR GS2/ISTP2	Autumn 2022	Winter 2023	Spring 2023	Summer 2023
Specialization courses:	**PPHA 44100 Microeconomics for Policy Analysis I**	**PBHS 38010 Introduction to Health Economics** **PPHA 44200 Advanced Microeconomics for Policy Analysis II**	**PPHA 42100 Applied Econometrics II** **PBHS 33300 Applied Longitudinal Data Analysis**	
Specialization-specific activities:	PHS Departmental Seminar	PHS Departmental Seminar	PHS Departmental Seminar	