



*Master of Science*  
*In*  
*Translational Research*

**2008-09**

**STUDENT HANDBOOK**

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Program Handbook 2008-2009  
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## **INTRODUCTION**

The Master of Science in translational research (MTR) is housed within the Institute for Translational Medicine and Therapeutics (ITMAT). The core missions of this institute are (i) to provide an intellectual home and core critical mass for those who pursue translational research; (ii) to expand the number of faculty pursuing translational research at Penn through direct recruitment and enhancement of recruitment packages of any academic entity; (iii) **to expand this critical mass by educating trainees and faculty in translational research**; and (iv) to become a single point of contact for Penn investigators seeking information and support to pursue translational research as well as for outside agencies wishing to engage with Penn in this area. The primary educational vehicle to achieve goal (iii) is the MTR program. The program has been in existence since the fall of 2004.

The rationale for the development of this program was to improve the spectrum and quality of research training by providing an educational curriculum to teach the fundamental skills needed to perform translational research. The primary objective is to produce a cadre of highly trained and sophisticated investigators adept in the skills necessary for the translational investigator; to prepare students for an academic career and to position them for future careers as successful academic researchers who will become leaders in their field of research interest.

The program is designed to meet these objectives through the provision of didactic in-depth instruction, a formal mentorship program, formal laboratory training, and specific ongoing guidance with hands-on exposure to protocol and grant development.

Upon successful completion of the MTR program graduates are expected to have developed a strong foundation in the fundamental techniques of translational research. They should be able to apply contemporary research tools to clinically relevant areas of investigation. The MTR program will produce clinical researchers who are competitive in seeking research support and who are knowledgeable about the complex issues associated with conducting sound translational research. The MTR program will also assist in the promotion of translational research as a discipline within the PENN community.

## **CORE TENETS OF MTR TRAINING**

### **Institutional Commitment to the MTR program**

The University of Pennsylvania is committed to maintaining the highest standards when training postdoctoral students and providing a program sufficient to ensure that, when completed, the trainee can function independently as a scientific professional. The responsible institutional official at this institution, Glen Gaulton, PhD, is designated to provide this oversight, and the SOM Office of Masters Programs, led by Donna George, PhD, together with the MTR administrative office is responsible for the administrative support of MTR students.

## **Quality Training in the MTR Program**

The goal of the MTR program is to train future translational scientists. Individuals in this program are provided with the expertise and methods required to attain this goal. This includes the basic components of scientific training, the specific methods associated with their translational research interest as well as training in biomedical ethics and good clinical practice. MTR appointees learn how to independently formulate meaningful hypotheses, design and conduct interpretable experiments, adhere to good laboratory and clinical procedures, analyze results critically, understand the broad significance of their research findings, and uphold the highest ethical standards in research. The development of additional skills—including oral and written communication, grant writing, and laboratory management—are considered integral to this training.

## **Mentoring of MTR students**

Effective mentoring is a key critical component of research training. It facilitates the development of the trainee and conversion into becoming an independent investigator. Mentoring requires that the primary mentor dedicate substantial time to ensure personal and professional development. The MTR program recognizes that a good mentor builds a relationship with the trainee that is characterized by mutual respect and understanding. The MTR mentoring program recognizes that the attributes of a good mentor include being approachable, available, and willing to share his/her knowledge; listening effectively; providing encouragement and constructive criticism; and offering expertise and guidance.

# **ACADEMIC PROGRAM**

## **MASTER OF TRANSLATIONAL RESEARCH DEGREE REQUIREMENTS**

### **Postdoctoral and Predoctoral Curriculum**

The MTR degree is composed of 12 credit units

- 4 required courses
- 2 elective courses
- 4 laboratory experiences
- 2 thesis credits

### **Description of Required Course Work:**

#### **MTR 600 Introductory Biostatistics: 1 c.u. (Summer semester - year one)**

This course approaches statistics from an applied as well as theoretical point of view. Students learn the correct application and interpretation of basic statistical concepts and techniques. The course covers probability estimation, hypothesis testing, nonparametric tests, tests for categorical data, correlation, and regression.

**MTR 601 Fundamentals of POR: 1 c.u. (Fall semester year one)**

Content includes study design and protocol development as they relate to the studies that probe the mechanism of disease and the study of complex traits. It discusses concepts such as sample size calculation, study populations, use of markers to study disease progression, pharmacogenetics and feasibility issues. Early development of the research protocol starts during this course and is evaluated prior to course completion.

**MTR 602 Scientific and Ethical Conduct: 1 c.u. (Spring semester year one)**

Content areas include good laboratory practices, good clinical practices, regulatory affairs including the role of the FDA and research ethics, scientific conduct and misconduct. Financial considerations including budget development for grant proposals. Students serve as an active member of an IRB for 6 months. The informed consent document that accompanies the research protocol is developed during this course

**MTR 603 Disease Measurement Course: 1 c.u. (Fall semester year one)**

Acquire the knowledge to rationally and effectively incorporate disease measurements, including emerging technologies, into the design of translational and clinical research protocols. Gain a basic understanding of measurement methodologies used in clinical medicine. Understand how "normal" values are determined, and how to interpret test results in the context of patients/research subjects. Approach disease measurements (tests) as a mean of answering questions, and to be able to choose appropriate tests to answer the questions being posed. The measurement aspects of the students' research protocol are written and evaluated during this course.

**Description of Elective Course Work:**

In addition to the required courses, trainees take electives that must total two course units. The student's primary mentor in discussion with MTR programmatic mentor must approve the elective courses chosen by the student at least 2 months in advance of registering for the course. These should be graduate level courses in an area of concentration that complements the student's future career plans in translational research.

The list below is a representative sample of the elective course options. It is anticipated that elective courses will be pursued in the first and second years. Elective courses outside the school of medicine can also be considered but require prior approval by the PD.

**MTR 606 Principles of Clinical Pharmacology: 1 c.u. (Fall and Spring semesters)**

This course is designed to meet the needs of researchers who have an interest in the clinical pharmacologic aspects of contemporary drug development and utilization. The course provides an introductory review of pharmacokinetics, drug metabolism and transport, assessment of drug effects, drug therapy in special populations, and contemporary drug development. Registration for this course begins in the Fall and students must attend both terms to receive 1 credit unit.

**MTR 607: Pharmacometrics: 1 c.u. (Spring semester)**

This course introduces the discipline of pharmacometrics, highlighting related disciplines such as Clinical Pharmacology and Biostatistics and demonstrating the application of pharmacometric principles applied to drug development and translational research. Relevant statistical methodology is introduced along with targeted lectures in pharmacokinetics, pharmacodynamics and population-based methods.

**Regulation of Eukaryotic Gene Transcription (Genetics 608)**

This is an advanced seminar course emphasizing the molecular biology and molecular genetics of transcription in eukaryotes. Based on current literature, the presentations and discussions familiarize the student with current technology and developing principles.

**Fundamentals of Pharmacology (PHARM 623)**

This course emphasizes quantitative approaches to analyzing biochemical and pharmacological data. Students examine basic principles of drug action, including: drug disposition and metabolism, pharmacokinetics, drug receptor interactions, enzymes as targets for drug action, and experimental methods used in molecular pharmacology

**Advanced Topics in Cell Biology/Molecular Mechanisms of Pathogenesis (CAMB 691)**

This course will examine selected topics in cell biology, with a focus on understanding disease at the molecular and cellular level. Topics to be addressed include the cellular cytoskeleton, muscle cell biology, neuronal cell biology, cytokinesis, and genetic and acquired diseases that have been associated with defects in each of these areas. Course evaluation will be based on presentations, participation in discussions, and a final paper.

**Description of Laboratory Rotations: (MTR 999 – flexible timing)**

Completion of 4 lab units is required. Lab rotations need approval of the candidate's primary mentor and the MTR program director 2 months prior to commencing the lab rotation. Lab units can represent 4 different learning experiences or may be a combination of 2 units in 2 distinct areas. Examples of lab rotations include, but are not limited to, a traditional wet bench experience to learn how to develop / perform an assay or measurement technique; a clinical lab rotation learning how to perform /analyze a technique in your specialty; a rotation in a bioinformatics laboratory or a rotation in an imaging laboratory. The lab experiences are selected based on the student's proposed project and targeted to his/her overall research aims.

The purpose of the lab experience is to emphasize the basic components of the translational research experience, to appreciate that the underpinnings of translational research is understanding disease mechanism, and to learn the subtleties of measurement of disease process and the complexity this brings to the area of human research. Following completion of each lab experience, students are required to submit a "lab book" with documentation of the elements listed below.

- (i) The purpose of the lab unit
- (ii) The methodology learned
- (iii) The experiments performed
- (iv) The data analyzed
- (v) Meetings with lab mentor or collaborators to discuss the analysis

Grading of each lab unit is performed by the lab mentor and a grading sheet is submitted to university as an equivalence of exam grade.

**MTR 604 & MTR 605: Thesis (2 credit units)**

Candidates are expected to complete and defend a research thesis. The thesis project is described in detail in a later section

Registration for the thesis units represents that the student has completed the fundamentals of the program. Evidence of hands-on experience in formulating one or more research questions; searching the medical literature; translating research question(s) into an appropriate research design; assessing study feasibility; writing a detailed study protocol; designing data collection instruments; and implementation of the research protocol.

Completion of the thesis units should reflect all of the above in addition to performance of data analysis. Overall completion should 1) represent the student’s knowledge of the principles and practice of translational research; 2) provide evidence of their first experience in writing a comprehensive NIH grant style proposal; 3) provide documentation of the development, implementation and analysis of the data collected from the research project and; 4) present a summary of the results in 1-2 publishable manuscripts melded into the form of a thesis ready to defend at a public seminar.

**Planning for MTR Course Work**

**SAMPLE POSTDOCTORAL STUDY PLAN**

Year	Summer	Fall	Spring
1	MTR 600 MTR 999	MTR 601 MTR 603	MTR 602 Elective 1
2	MTR 999 MTR 999	Elective 2 MTR 999	MTR 604 MTR 605

**Mentoring**

An essential component of the MTR degree program is the mentoring program. As stated earlier, effective mentoring is critical not only for research training but also to allow the trainee to develop into an independent investigator. Mentoring requires that the primary mentor dedicate substantial time to ensure personal and professional development. A good mentor builds a relationship with the trainee that is characterized by mutual respect and understanding. Attributes of a good mentor include being approachable, available, and willing to share his/her knowledge; listening effectively; providing encouragement and constructive criticism; and offering expertise and guidance. We recognize the importance of these attributes and the

significant time required to mentor effectively. For this reason we have in place the MTR mentoring program.

The program requires the establishment of specific milestones and the definition as to when these milestones should be accomplished within the training period. Examples of such milestones are 1) data acquisition and analysis; 2) preparation and submission of manuscripts; 3) grant submission; 4) conditions regarding authorship; 5) mentor expectations of the mentee and; 6) mentee expectations of the mentor.

All students enrolled in the MTR degree program have a Mentorship Committee. This is composed of the lead (primary) mentor, a secondary mentor and a programmatic mentor. This three person committee functions as an ongoing monitoring group for the candidate's progress. Its members are faculty with expertise relevant to both the basic and clinical aspects of the candidate's research, and each is expected to contribute their expertise to fostering the candidate's research progress.

The primary mentor typically provides the direction for the research project and basic science components of training. The secondary mentor is typically the clinical extension of the basic science research elements and is often also involved in overall career decisions of the trainee. The programmatic mentor is responsible for the overall transition of the student through the program for both the completion of the curricular elements as well as the research project.

The student identifies the primary mentor and the secondary mentor at the time of enrollment. The programmatic mentor is assigned to the student by the PD. The mentorship committee meets with the student at the commencement of the program, at the end of year one, in December of year 2, and upon successful completion of the thesis units in advance of thesis defense. The primary mentor discusses the mentoring compact with the student and sets expectations, and meets with the student on a weekly to biweekly basis. Additionally, the student meets with the programmatic mentor every semester during the first year to ensure ongoing progress through the program. Additional *ad hoc* meetings may occur as required.

## **Research Project and Thesis**

Translational research training is an integral component in the preparation of physician/scientists for career advancement as scientific professionals. The MTR trainee will undertake scholarship and research that together provide a training experience essential for career advancement in the new science of translational research. The training component is conducted in an apprenticeship model where she/he works under the supervision of an investigator who is qualified to fulfill the responsibilities of a mentor.

Students are required to engage in a research project of their own design under the supervision of the primary mentor. At the time of application, each student specifies the project they will pursue, along with the primary mentor who will supervise the clinical research project. Students will use class material and homework assignments to assist in protocol development.

The research should be translational in nature and involve direct measurements on patient-derived samples or the use of innovative therapeutic or diagnostic techniques with laboratory-based elements. There should be demonstrable clinical relevance. Use of the outpatient and inpatient facilities of the CTRC is to be encouraged. The protocol is to be designed by the student under the direct supervision of the mentor. Where appropriate, dual mentorship should be considered, including a basic scientist expert in the technology being used and a clinical investigator expert in the condition being studied. The primary protocol should account for at least 70% of the student's commitment to the program. Biostatistical support/tutelage is provided on an individual basis through the CTRC mechanism to support the student in the development of his/her protocol.

Trainees are expected to complete a thesis that involves designing a research project, writing a formal research proposal, performing the study described in it, preparing 1-2 comprehensive scholarly scientific paper(s) reporting the results, and presenting and defending the thesis at a public seminar. The defense portion of the seminar will be a formal oral defense of the thesis with two external examiners and one internal examiner.

The thesis should consolidate students' knowledge of the principles and practice of translational research, and provide their first experience in writing a comprehensive NIH grant style proposal. Students are expected to develop, implement, and analyze the data collected from the research project and summarize the results in a publishable manuscript(s). The thesis provides hands-on experience in formulating one or more research questions; searching the medical literature; translating research question(s) into an appropriate research design; assessing study feasibility; writing a detailed study protocol; designing data collection instruments; conducting the research, performing data analysis, where appropriate; and preparing a manuscript for publication. The MTR program requires that a student obtain experience in each of these facets of research. The structure of the proposal is expected to follow the NIH-R01 PHS-398 format as much as possible. Refer to the NIH website link <http://grants.nih.gov/grants/funding/phs398/phs398.html>

### **Types of Acceptable Thesis Projects**

The key criterion for an acceptable thesis is that it be of publishable quality and magnitude. Feasibility and scientific merit are two major factors to consider when deliberating thesis options. In general, it should be possible to complete the study during the second and third year of the program.

The thesis project must be able to stand on its own. In particular, the study must have a sufficient sample size to answer a research question. "Pilot" studies are generally not acceptable, but preliminary work that may lead to a larger effort in the future is encouraged, provided the work has adequate scientific merit and statistical power on its own accord. If a study is too small or not adequately designed to answer a question definitively, it will not be publishable in its own right. The student's primary mentor and advisors can provide substantial guidance in the pursuit of an appropriate question for the thesis proposal. The student is encouraged to think big by outlining a set of steps towards the answer to an important clinical issue and then develop one of the initial steps into a thesis project and proposal.

### **Starting the Thesis “from scratch”**

Students should begin the design process for their projects soon after entering the program by considering a range of options for addressing research questions of interest. The initial process is focused on finding and refining a relevant clinical question(s) suitable and appropriate to answer with a research study, which is generally considered to be the specific aim(s) of their project. The coursework introduces the principles of scientific study design early in the curriculum to provide the structural underpinning of the students’ discussions with their advisors. In refining the question, students have often changed their research focus as they realize the potential problems and possibilities available to answer questions that they find compelling. Research that has been initiated prior to starting the program will not be acceptable as a thesis. If the research questions have been defined but the protocol is not fully developed and can be modified throughout the year in response to input from all of the resources available to the student in the MTR program, it is likely that an acceptable project can be designed. The project should be of the student’s own choosing and related to their research and clinical interests. Many students will have thought about research questions before entering the program, and continuity with prior research activities is expected and encouraged. It is essential for each student to take advantage of the coursework and meetings with their advisors in developing the research plan in order to ensure that the thesis provides the opportunity for academic growth.

### **The Mentoring Committee**

As described previously, the mentoring committee consists of three persons. The primary mentor will serve as the mentoring committee chair. If the student has both a research mentor and a clinical mentor, both should be on the committee. In addition, a programmatic mentor sits on this committee.

### **Role of the Primary Mentor in the Master’s Thesis**

The primary mentor’s role is to help the student identify a feasible research question; explore alternative approaches to answering the question; identify content experts to supplement the mentor’s expertise; and advise the student on protocol development, student implementation, analysis, and summary for publication. The mentor’s role is not to assign a thesis to the student, but rather, the advisor should help the student translate his or her own ideas into a research project. Finally, the mentor is responsible for ensuring that the student formulates and adheres to a timeline to complete the thesis.

### **Laboratory Research for MTR Students**

Candidates for the MTR degree are required to participate in primary laboratory research. The purpose is to provide students with a meaningful experience in translational research. Candidates are expected to formulate a research proposal, conduct the research in the laboratory, collect data, and analyze it.

### **Protocol Development**

The protocol development process is one of the most important components of completing the master’s thesis. It is an iterative and interactive process between the student and his/her mentors that includes several phases: meetings with the mentors to think through a feasible research question and design; forming a mentoring committee; conducting a literature review; developing and getting approval for a mini-proposal; writing up an initial full protocol; completing required

course work; obtaining IRB approval for the study; presenting the thesis protocol at the annual MTR Protocol Presentation sessions ; and implementing the full protocol. Students may not begin to conduct their thesis research until IRB approval has been documented and the full written protocol has been approved by their mentoring committee.

### ***Timeline for Developing the Protocol***

Summer Term (first year):

1. Begin weekly meetings with mentor to discuss coursework and explore possible research questions for a thesis.
2. Conduct a literature review on likely thesis topics, discuss and choose a research topic, and refine objectives and specific aims.
3. At the beginning of September, or sooner if appropriate, begin in-depth discussions of the study design. The first joint meeting of the student and both of the mentoring committees should take place at this time.

Fall term (first year):

1. Draft the mini-proposal through collaboration with the translational research advisors for approval by the thesis committee
2. Develop a draft of the full proposal using the NIH PHS-3998 format (see <http://grants.nih.gov/grants/funding/phs398/phs398.html> for details on format).
3. Prepare for and present the protocol to the MTR Mentoring Committee at a special MTR 601 seminar at the end of December.

Spring Term (first year):

1. Refine the full proposal.
2. Prepare the IRB submission and submit by the end of the semester.
3. Obtain final approval for the full protocol from the primary advisor and thesis committee.
4. Inform IRB of any changes in the protocol and get final approval.

Summer Term (second year): *Initiate and implement the study.*

Fall Term (second year):

1. Continue implementation of the study
2. Collection of data
3. Complete protocol revisions and amendments as required and submit to IRB for approval
4. Initiate writing of the paper using the protocol to construct the introduction and methods with a clearly defined research and analysis plan.

Spring Term (second year):

1. Initial protocol-driven analysis of research results.
2. Complete writing of the paper by filling in appropriate tables and results, and writing the discussion section.
3. If time allows, conduct secondary analyses for additional papers (resist the urge to do this until after your initial paper is submitted for your degree).

### **Mini-Proposal**

The student is required to draft a single-spaced 2-4 page maximum mini-protocol due typically around the end of the first Fall term in the program. This protocol serves as the basis for the initial approval of the thesis committee to ensure that there are no unexpected surprises in the full proposal. The mini-proposal should serve as the backbone of the full proposals to follow. The mini-proposal should be built around the section of the PHS-398 form known as the Specific Aims, which includes a brief justification (to be filled out later in the Background and Rationale section); and specifics about the methods, including sources of data, variables to be collected, sample size estimate or power calculations, and analysis plans. The proposal should include a concise section on potential limitations and thoughts about future research directions based on the proposed research. It is required that all three members of the Thesis Committee approve the mini-proposal. Verification of approval is provided by submitting the signed mini-proposal form.

### **Developing the Full Protocol**

During the spring term of the first year, most students will develop the full protocol for the research project. Due typically by the end of the first Spring term. The NIH-398 format grant application format should be used, with the following sections: Specific Aims, Background and Rationale, Preliminary Studies (if any), Methods, and Timeline. The Methods section should describe the study design; provide a bulleted rationale for each aspect of the design decisions; define and defend the population to be studied and source of study subjects or data; specify the variables to be collected, method of data collection and rationale for each particular outcome in the analysis; identify the data analysis plan with specific sample size calculations and justification; and explain potential strengths and limitations of the study, specifically defining the potential effect each limitation may have on the results, and how each one will be handled. Other sections specifically pertinent to the study should be included in a brief section on potential future spin-offs from the study.

Students should submit this protocol to the primary mentor for review and comments. Note that several drafts are typically needed. The biostatistics advisor should be involved in the process as should the third committee member. Once the primary mentor and student are comfortable with the proposal, it should be formally approved by all of the committee members.

Once revisions are complete and the full proposal is approved, students should have their primary advisor sign the Full-Proposal Approval form for submission to the MTR Program Office (971 Maloney Bldg, HUP), indicating that all members of the committee agree on the acceptance of the proposal.

### **Conduct of the Research**

It is required that the student personally conduct all aspects of the thesis project. In certain circumstances where the amount of work required exceeds what could be reasonably expected of a single investigator, help can be used in the collection of data and data entry. In such cases, the student is expected to oversee the process and provide sufficient monitoring to ensure that the quality of the data is not compromised. Once the data is collected and properly entered into a computer database, the student is responsible for data cleaning, creating analytic files, and the primary analysis of the data. It is expected that the student will seek the advice of his or her mentors during this process to ensure an efficient and appropriate analysis process.

### **The Final Product**

The writing of the thesis is again, the primary responsibility of the student, with input from his/her mentors including reading and comments on the paper as the process progresses. The final thesis should be in the format of a journal article and should be acceptable for submission to a journal once approved by the mentoring committee. The primary mentor should be the one to review the thesis first. Once the mentor's suggestions are incorporated, the thesis must be submitted to the other members of the Committee for formal approval. Once the student responds satisfactorily to the comments of all committee members, the thesis will be approved. Final approval of the thesis will be conveyed to the MTR Program Office from the primary mentor (email notification is satisfactory) along with an electronic copy of the thesis. It is expected that all MTR theses will be submitted for publication and a copy of the final paper should be submitted to the MTR Program Office to be included in the student's file.

### **Procedures for Changing the Thesis**

All students in the Master of Science in Translational Research program must develop and complete a thesis project as fulfillment for the degree. This process involves developing a project under the guidance of the student's mentor, receiving feedback from fellow students and faculty, executing the project, and writing up the thesis for approval by the Mentoring Committee.

It is very important to note that changes to the originally proposed thesis project should be extremely rare. The originally proposed thesis project will have been developed with careful guidance from the student's mentor and numerous other faculty and students. As such, the project should be tenable from both a scientific and logistic standpoint. It is only under extremely rare circumstances that a thesis project should need to be changed.

Nonetheless, it is recognized that the initially proposed thesis may not always be tenable for reasons of logistics, time, or unforeseeable circumstances. Should it become impossible to complete the originally designed thesis, a student may request to change the project.

The following steps must be taken prior to changing the originally approved thesis topic:

- 1) The reason for not completing the originally proposed project must be documented in writing and distributed to the student's primary mentor, the programmatic mentor, the PD of the MTR program, and the director of ITMAT.
- 2) The above-mentioned faculty members must all agree that the thesis project is not feasible.
- 3) The student must then propose an alternate thesis project to their primary mentor, programmatic mentor and PD of the MTR program. This project must meet the same requirements as the originally proposed thesis, including writing of a formal protocol under the guidance of the student's mentor (even if the project has already been started), approval of the protocol by the PD and mentoring committee, and proper execution and completion of the project.

It is recognized that students will often be working on numerous projects along with their originally proposed thesis project. One of these projects may be used as the student's thesis project only if the project was developed under the guidance of the student's mentor. Projects

developed with other faculty members, or developed prior to enrolling in the Master's program, will not qualify for the Master's thesis. Regardless, all of the above-mentioned steps must be taken before the project is acceptable as a thesis.

## **Time Limitation**

The MTR program is designed as a full-time program. The time to complete the didactics is typically 2 years and the research project may take up to 3 years to complete. The maximum time permitted to complete the MTR degree is 5 years.

## **Non-Credit Academic Requirements**

In addition to the course work, students are required to participate in a series of additional non-credit programs intended to round out their experience. These requirements are listed below.

### **ITMAT SEMINAR SERIES**

Attendance and participation in at least 80% of the monthly ITMAT Seminar Series over the full two years. The Seminar takes place on Fridays once every 4 weeks from 1-2 pm September through June annually and sign-in is expected of all attendees.

### **ITMAT JOURNAL CLUB**

All enrolled students present at the journal club once a year; this presentation will be based upon the student's proposed area of research. The purpose of the seminar series is to provide students with a sense of belonging to core groups of research trainees, to facilitate their comfort level with presentation of scientific data, and to continue to address issues related to study design and ethics in research. One session per semester will be used to discuss housekeeping issues relating to the MTR program such as scheduling of course work, issues related to lab time, tuition concerns and grant deadlines.

### **HIPAA & CITI REQUIREMENT**

Prior to the start of any research activity, all students, fellows and faculty are required to complete several online certifications. They include CITI-Protection of Human Subjects Research Training, and HIPAA Education and Bioethics certifications. The site for accessing and completing the certification is called KnowledgeLink [www.knowledgelink.upenn.edu](http://www.knowledgelink.upenn.edu). When training is complete you are asked to print out the certification pages and submit documentation to the MTR Coordinator's office.

Additionally, all students in the MTR Program are required to submit their research protocols for IRB approval. This must be done through the Penn Office of Research Administration (ORA). Full written IRB approval or granting of an exemption, in compliance with all local, state and federal laws and guidelines, is required of each separate research project, no matter where it is conducted and even if part of a larger and previously approved study. If you are working on an already approved project, then documentation that the IRB office has officially added you as an

investigator to the project will be required. This must be done before any work on the research has begun.

## **MTR Policies**

In addition to the specific policies listed below, the MTR Program adheres to the broader policies set forth by the Biomedical Graduate Studies group as well as those set forth by the University of Pennsylvania. Documentation of these policies can be found at the following websites:

Biomedical Graduate Studies Policies: <http://www.med.upenn.edu/bgs/links/>; University of Pennsylvania Policies: <http://www.upenn.edu/grad/policies.htm>. MTR-specific policies are listed below.

### **TRANSFER CREDIT POLICY**

Twelve course units and completion of a thesis are required for the MTR degree. Ten course units must be taken at the University of Pennsylvania, with 10 course units taken in the MTR program. MTR students may request to transfer up to two graduate level credits from an accredited program outside the University. Transfer credit may not be applied to the 10 MTR required courses but may be applied to the electives with the prior approval of the MTR Program Office. Transfer credit may not be applied to any of the 4 Laboratory course units required for the MTR degree. Courses taken on a pass/fail basis and courses taken more than three years ago will not be considered for transfer credit. Only courses in which the student received a grade of "B" (3.0) or better will be considered for transfer credit.

Requests for transfer credit should be submitted to the MTR Director together with a course syllabus for the course under consideration. The director will request a review of the course by an MTR faculty member in that content area for its appropriateness for MTR transfer credit. Students may request substitution of a core course with a *more advanced course* in that content area. The process for substitution is the same as that for transfer credit.

### **REGISTRATION**

#### **Continuous Registration**

Continuous registration as a Master's student is required unless a formal leave of absence is granted by the dean of the student's school. A leave of absence will be granted for military duty, medical reasons, and for family leave; this leave is typically for up to one year and "stops the clock" on time to completion. Personal leave for other reasons may be granted for up to one year with the approval of the Graduate Dean, but it does not automatically change the time limit.

#### **Registration**

Students register for courses using the University's electronic registration systems -- PARIS (573-PENN) and Penn-in-Touch (<https://sentry.isc.upenn.edu/intouch/>). New students register for courses at the beginning of their first term. Continuing students register before the semester starts during the advance registration period. Students can change their course schedule without penalty up to the end of the add/drop period. The advanced registration, add, and drop periods are noted on the university academic calendar which is published in the Almanac each year. The

calendar is included in this handbook and is available on the Registrar's website at <http://www.upenn.edu/registrar/>. Information on course offerings at the University (e.g. timetables, classrooms, and course descriptions) can be found on the Office of University Registrar's website at <http://www.upenn.edu/registrar>. Navigate the site using the links on the left hand side of the webpage. The most up-to-date information on MTR courses can also be found on the MTR website <http://www.med.upenn.edu/mtr/>. The MTR Coordinator will register all degree students for MTR required courses and can be reached via email at: [mtrpor@mail.med.upenn.edu](mailto:mtrpor@mail.med.upenn.edu).

## LEAVE OF ABSENCE

A student who wishes to take a leave of absence must submit a written request to the MTR Program Office for initial approval and then it will be forwarded to the Associate Dean in the Office of Masters Program for final approval. The granting of a leave of absence does not automatically change the time limit for the degree. For information about Penn's policy for Involuntary Leave of Absence, please click on the Provost website to view The Pennbook Resources, Policies and Procedures Handbook. <http://www.vpul.upenn.edu/osl/pennbook.html>

## Administrative Requirements for the MTR Degree

Throughout the program, students will be required to keep track of and follow through on all administrative requirements for the MTR degree. Here is a summarized list of the requirements:

- 1) Online training certification – as mentioned you will be required to complete HIPAA, and CITI training on line (see [www.knowledgelinek.upenn.edu](http://www.knowledgelinek.upenn.edu) ). Proof of completion for these online trainings should be submitted to the MTR Program Coordinator's office.
- 2) Thesis proposal form – students are required to complete a thesis proposal form with original signature to the program director, Emma Meagher, M.D.
- 3) IRB approval – every student must submit current IRB status information on the IRB Information Form. This must be submitted before any research on the MTR protocol has commenced.
- 4) Diploma application – In order to be considered for conferral of the degree, a student must complete a “diploma application” approximately three months prior to the expected conferral date. This is coordinated with the Coordinator of the MTR Program. The diploma application initiates an academic audit that, assuming all requirements are met, then places the student with the next graduation cohort. The MTR degree is conferred by the University of Pennsylvania School of Medicine and is granted in May or December of each year.
- 5) Course evaluation – students are required to complete a course evaluation for every course. These are typically distributed at the end of the term.
- 6) MTR Exit Form – Graduating students are required to complete an exit survey form.

## **Research Regulations Compliance**

Because much of the research conducted by our students involves clinical data, it is essential that all studies comply with various research regulations. These policies are designed to protect patient and human subject privacy:

1. Institutional Review Board Approval: All students are required to submit documentation demonstrating that IRB approval has been received for their MTR thesis project.
2. The online CITI Certification Program: All students must complete this training via Knowledge Link (<http://knowledgelink.upenn.edu>).
3. The online “HIPAA Education for UPHS Physicians, House Staff and U of P SOM Faculty” Go to <http://www.uphs.upenn.edu/hr/training/hipaa/hipaa.html>

## **Academic Standing**

The MTR degree program has specific academic standards that are expected of all students. Evaluation for most courses is based on letter grades as follows: “A,” distinguished; “B,” good; “C,” unsatisfactory; “D,” poor; and “F,” failure. Pluses and minuses may be awarded for each letter grade, at the discretion of the course director. It is expected that all students receive a B- or better in each of the courses being applied to the MTR degree.

Any student who receives a grade lower than B- in any course (i.e., receives a C+ or lower) will be placed on academic probation. This includes students who would receive a B- in a course but instead receive an “incomplete” for any reason. A return to good academic standing is contingent on receiving an acceptable grade (B- or higher) for that course within one year of originally taking the course in which one received the unacceptable grade. Students may continue to take other courses while on probation with the permission of the MTR Program Director with input from the selected course directors, as needed. The student must make arrangements with the course director to remediate any grades lower than a B- and these arrangements must be approved by the program director with input from the MTR Advisory Committee as needed. Options include studying on his/her own and arranging with the instructor to re-take or resubmit the work that led to the unacceptable grade, and taking the course again during the next semester in which it is offered. Additional remediation may be required based on the judgment of the program director, the student’s advisor, the MTR Advisory Committee, and/or the course directors. Any student who receives an unacceptable grade in a course for the second time or fails to meet the remediation plan will be dismissed and will not be eligible for re-admission. The status of any student who is or has previously been on probation and who receives an unacceptable grade for an additional course will be reviewed by the MTR Advisory Committee, the program director, and the student’s mentoring committee. This committee is authorized to dismiss the student or allow the student to remain in the program on a probationary status.

## **Academic Grievances**

Students who have a concern about a matter related to the MTR program, whether it concerns a course, instructor, or mentorship, are encouraged to come to the MTR Program Office (971 Maloney Bldg/ HUP) to discuss their concern. Alternatively, the student may wish to speak directly with their MTR mentor and/or the Program Director, Dr. Emma Meagher, about the issue.

## Miscellaneous Details

### **PennCard**

PennCard is the official identification card of the University of Pennsylvania and is required for all students. The PennCard Center is located on the 1st floor of the Franklin Building at 3451 Walnut Street. A valid government issued photo I.D. will be required in order to pick up your new PennCard. The Office can be reached via e-mail at [penncard@pobox.upenn.edu](mailto:penncard@pobox.upenn.edu) and online at <http://www.upenn.edu/penncard>.

### **PennKey**

Your PennKey name and password gives you access to PennNet, a Penn e-mail account, and many other essential services managed through the MTR Program. All students are required to have a current, active PennKey and password.

### **Penn InTouch**

Penn InTouch provides secure web access to view current billing information, course registration and schedules, academic records, student health insurance, etc. Access to this site requires login with PennKey and password. <https://sentry.isc.upenn.edu/intouch/>

### **The PennPortal**

The PennPortal webpage bundles together links to important information for students. Access the PennPortal at [http://www.upenn.edu/penn\\_portal](http://www.upenn.edu/penn_portal) and log in with your PennKey name and password.

### **Black Key**

Many of the School of Medicine buildings are restricted to black key access only. Therefore, students may need to obtain a black key, depending on where classes are held. Students must complete a requisition form and submit it to the Pharmacology Business Office (M102 John Morgan) for approval signatures. Keys can be picked up at the security office in the lobby of Stellar-Chance. The security office is open for black key pickup from 11:00 a.m.-1:00 p.m. only.

## Financial Information

### **Academic Year 2008-2009**

The MTR tuition is \$4,000 per course unit plus general and technical fees. Tuition for non-MTR courses vary by department and students should contact the individual department to verify tuition cost. The breakdown for MTR tuition and fees is shown in the table below:

### **DESCRIPTION OF FEES**

**General Fee:** The amount of the general fee is based on the number of course units taken. The general fee enables the University to maintain essential facilities such as the library system, museums and institutes, special laboratories, the Student Health Service, Athletics, and Career Services, all of which provide benefits to students both before and after graduation.

**Technical Fee:** Students are charged a technical fee for computing services such as access to computer labs and use of email accounts.

**Clinical Fee:** Full-time students are required either to pay a separate Clinical Fee for access to the Student Health Service or to enroll in a health insurance plan that provides a capitated payment to the Student Health Service (i.e., the Penn Student Insurance Plan or a private plan that provides an equivalent capitated payment). A review of the Penn Student Insurance Plan can be found at the following website: <http://www.vpul.upenn.edu/shs/shi.html>

#### **MTR TUITION AND FEE BREAKDOWN FOR FY 2009\*\***

Fall/Spring	Tuition	General Fee	Technical Fee
1 C.U.	\$ 4,000	\$ 250	\$ 181
2 C.U.	\$ 8,000	\$ 500	\$ 362
3 C.U.	\$ 12,000	\$ 1,000	\$ 541
4 C.U.	\$ 16,000	\$ 1,000	\$ 541

\*\*The degree has a total of 12 course units

*Note: Tuition and fee information for joint-degree programs are different from the above. Please contact the MTR Coordinator's office to verify fees for these programs.*

### **MTR Administrative Structure**

**The institutional governance and oversight of the Master of Translational Research Program** resides in the School of Medicine (SOM) Office of Master's Programs (OMP), within the Office of the Vice Dean for Research and Research Training. The Academic home for the MTR program is the Institute for Translational Medicine and Therapeutics. Programmatic oversight is provided by the MTR advisory Committee.

**The Participating Schools** in the MTR program are the Schools of: Medicine, Arts and Sciences, Veterinary Medicine, Nursing, and Dental Medicine.

**The Program Director** is responsible for administrative oversight and academic leadership of the program. The Director also serves as a primary academic advisor to MTR students and is the chairperson of the Advisory Committee and the Students Selection Committee. The current Program Director is Emma Meagher, MD

**The MTR Advisory Committee** serves generally to advise the Program Leadership on all matters related to implementation and evaluation of the MTR program and other related MTR activities, and also currently serves as the Admission Committee until a separate committee shall be established. Specific responsibilities of this committee include establishing criteria for membership in the MTR program, making admissions decisions, monitoring the work of the standing committees, recruiting faculty for the program, and developing liaisons with appropriate Penn centers and institutes. Each member of the committee shall have one vote.

**The MTR Selection Committee** meets to identify new MTR students and award funding. The Committee follows the NIH model of scoring of applicants and proposed projects by multiple reviewers, and making decisions based on the scores.

## **JOINT DEGREE PROGRAMS**

Potential applicants for the joint-degree are Medical, Dental, Veterinary and Nursing students. The following joint-degree programs are offered or are in development in conjunction with MTR:

- (1) MD-MTR
- (2) PhD-MTR
- (3) MSN-MTR
- (4) VMD-MTR
- (5) DMD-MTR

Students interested in pursuing a joint degree program are encouraged to discuss their interests with the MTR Program Director, Emma Meagher, M.D.

## **MD-MTR Curriculum and Program Structure**

Students will complete three years of the MD curriculum before beginning full time study in the MTR program in July at the end of year 3. (Students who are interested in the program early in their time as medical students may take Case Studies in Translational Research for elective credit during fall of the 2nd year in medical school, and can also begin exploring the possibilities for their research project before beginning full time course work).

The July 1 start date for full time MTR work means that MD-MTR students will have only six months (from January through June) of year 3 to complete step 1 of the boards and take the electives and “Sub-Is” they need for residency application. Faculty advising and close communication with Helene Weinberg about scheduling issues are absolutely essential, given the compressed time frame.

Students considering the MD-MTR program should start planning as early as possible in their first or second year of medical school to make the best use of their time.

All of year 4 and the fall of year 5 will be devoted to full time work toward the MTR, during which time students are not registered for the MD.

Note that to retain status as a full time student during the MTR program, students must be registered for at least 3 course units during the Fall and Spring semesters of year 4 and the Fall semester of year 5. To maintain full time status no registration is required for the Summer term. The spring of year 5 will be used to complete the final requirements for both degrees.

The MD-MTR requirements are identical to those of the free-standing MTR degree option.

- 4 required courses (MTR 600, MTR 601, MTR 602, MTR 603)
- 2 elective courses
- 4 laboratory experiences (4 different units of MTR 999)



**The MD-MTR Committee** is a subcommittee of the Admissions Committee and is charged with: 1) providing career guidance to prospective MD-MTR students, including MD students who are interested in translational research but are undecided about the MTR program; 2) providing advice and counseling to students enrolled in the MD-MTR joint-degree program; and 3) screening applications to the MD-MTR program and make recommendations to the MTR admissions committee. The current Chair of the MD-MTR Advisory Committee is Emma Meagher, MD

**For more information about MD-MTR contact:**

Emma A. Meagher, M.D.  
Director, MTR Program  
991 Maloney Bldg.  
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Jean Fox  
Financial Aid Officer  
Office of Admissions and Financial Aid  
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Amy Nothelfer, L.S.W.  
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## FACULTY LIST

### *Core Faculty*

**R. Nick Bryan, M.D., Ph.D.**, Eugene P. Pendergrass Professor of Radiology, Dept. of Radiology

**Don Baldwin, Ph.D.**, Faculty Director, Penn Microarray Facility

**Jeffrey Barrett, Ph.D., FCP**, Research Associate Professor, CHOP Division of Clinical Pharmacology & Therapeutics

**Daniel Bogen, M.D., Ph.D.**, Professor of Bioengineering, Department of Bioengineering

**Dean Carlow, M.D., Ph.D.**, Assistant Professor, Department of Pathology & Laboratory Medicine

**Andrew Cucchiara, Ph.D.**, Adjunct Assistant Professor of Biostatistics, Center for Clinical Epidemiology & Biostatistics, Dept. of Biostatistics & Epidemiology

**Christos Davatzikos, Ph.D.**, Professor, Department of Radiology

**Chaitanya Divgi, M.D.**, Chief of Nuclear Medicine and Clinical Molecular Imaging

**Wafik El-Diery, M.D., Ph.D.**, Professor of Medicine, Division of Hematology -Oncology

**James Eberwine, Ph.D.**, Co-Director, Penn genome Frontiers Institute

**Mike Feldman, Ph.D.**, Associate Professor, Pathology & Laboratory Medicine

**Garret A. FitzGerald, M.D.**, Chair and Professor of Pharmacology, Dept. of Pharmacology; Director, Institute for Translational Research and Therapeutics

**Gregg J. Fromell, M.D.**, Executive Director, Office of Human Research, Univ. of Penn. School of Medicine

**Troy Hallman, MS, VMD**, Director of Animal Welfare, IACUC

**Sridhar Hannenhalli, Ph.D.**, Assistant Professor, Penn Center of Bioinformatics

**John H. Holmes, Ph.D.**, Assistant Professor, Center for Clinical Epidemiology Biostatistics

**Junhyong Kim, Ph.D.**, Co-Director, Penn Genome Frontiers Institute

**Lori Landgrebe**, Quality Management, Pathology Biosource

**Jennifer Langenberger**, Director, Intellectual Property, Center for Technology Transfer

**Bruce Levine, Ph.D.**, Research Associate Professor, Pathology & Laboratory Medicine

**Andrew Maidment, Ph.D.**, Assistant Professor, Section Chief, Department of Radiology

**Emma Meagher, M.D.**, Director, Translational Research Training Programs; Executive Chair, Institutional Review Board; Associate Professor of Medicine and Pharmacology

**Jon F. Merz, M.B.A., J.D., Ph.D.**, Associate Professor and Associate Chair for Faculty Affairs, Dept. of Medical Ethics; Senior Fellow, Center for Bioethics; Associate Scholar, Center for Clinical Epidemiology and Biostatistics

**Jonni Moore, Ph.D.**, Associate Professor of Pathology and Laboratory Medicine

**Kenneth Rockwell, Jr., Pharm.D., M.S.**, Director, Investigational Drug Service  
**Bruce A. Sachais, M.D., Ph.D.**, Assistant Professor of Pathology and Laboratory Medicine  
**Chandra Sehgal, Ph.D.**, Director Professor Department of Radiology  
**Leslie Shaw, Ph.D.**, Professor, Department of Pathology & Laboratory Medicine  
**Judy A. Shea, Ph.D.**, Professor of Medicine, Division of General Internal Medicine  
**Mitch Schnall, M.D., Ph.D.**, Professor and Vice Chair, Department of Radiology  
**Don Siegel, M.D., Ph.D.**, Professor and Vice-Chair Chief, Division of Transfusion Medicine  
**Karen Teff, Ph.D.**, Director, Translational Research Program; IDOM Associate Director  
**Felix Wehrli, Ph.D.**, Professor, Department of Radiology  
**Tracy A. Ziolk, M.S., C.I.P.**, Associate Director, Education & Training, Office of Regulatory Affairs