The Compass

Handbook of the
Vanderbilt Medical Scientist Training Program

June 2014
# Table of Contents

<table>
<thead>
<tr>
<th>I. Introduction</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Program Goals and Overview; B. MSTP Training Grant; C. Program Outcomes; D. Program Personnel</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. History of the MSTP at Vanderbilt</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>III. MSTP Curriculum</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Medical and Graduate Training; B. The MSTP Clinical Investigation Track</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV. Medical Curriculum 2.0</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The Foundations of Medical Knowledge Year; B. The Foundations of Clinical Care Year; C. Foundations of Biomedical Research; D. Immersion Year; E. Foundations of Healthcare Delivery</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V. Graduate Training</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Graduate School Training; B. Requirements; C. Ph.D. Thesis; D. Change of Mentors; E. Graduate Credit Hours</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VI. MSTP-Clinical Investigation Track (MSTP-CIT)</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Introduction; B. Program Overview; C. Graduate Coursework; D. Rotations; E. Mentors for MSTP-CIT Students; F. Funding for the MSTP-CIT; G. Applications to the MSTP-CIT</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VII. Laboratory Rotations</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rotation Purpose B. Rotation Requirements; C. Mentor Eligibility and Listing; D. Mentor Guidelines; E. Rotation Requests; F. Student Rotation Responsibilities; G. Preceptor Rotation Responsibilities</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VIII. Declaring a Graduate Department</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Choosing a Thesis Mentor; B. Being Assigned to a Thesis Mentor; C. Multiple Students and One Mentor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IX. Mentor Selection Criteria: Questions for Careful Consideration</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Laboratory Environment; B. Mentoring and the Mentoring Relationship; C. The AAMC Compact; D. Traits of a Successful Ph.D.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X. Registration</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Medical School and Graduate School; B. MSTP Seminar Series; C. Responsible Conduct of Research; D. Registration during Graduate Years</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XI. Student Progress</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Appraisal of Medical and Graduate Course Grades; B. Student Individual Development Plans; C. Evaluations by Mentors and Thesis Committees; D. Performance on Ph.D. Qualifying Examinations; E. Probation; F. Attendance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XII. Advising System</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. MSTP Leadership Team; B. MSTP Advising Colleges; C. Departmental Directors of Graduate Studies; D. Research Mentors; E. Other Advisors</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XIII. Funding and Stipends</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Funding for MSTP Students; B. Pay; C. Taxes; D. Extracurricular Work or Activities</td>
<td></td>
</tr>
</tbody>
</table>
XIV. Health Insurance and Leave Policies
   A. Health Insurance; B. Vacations; C. Sick Leave; D. Parental Leave; E. Leave of Absence

XV. Travel Support for MSTP Students
   A. Overview; B. Scope; C. Guidelines

XVI. Awards, Fellowships, and Other Extramural Funding
   A. The Canby Robinson Society Fellowships; B. The Shayne Scholarship; C. Other Fellowships;
   D. Other Extramural Funding Sources

XVII. Reentry into Medical School from Graduate School
   A. The Thesis Defense; B. Notification of Intent to Reenter Medical School; C. Reentry
   Procedures; D. Immersion Year; E. Required Meetings; F. Helpful Advice

XVIII. MSTP Seminar Series
   A. Overview; B. Design; C. Objectives; D. The Mentor-Presenter Relationship and Expectations;
   E. Manuscript Choice; F. Presentations; G. Feedback; H. Grades; I. Attendance

XIX. MSTP Clinical Preceptorship Program
   A. Overview; B. Course Objectives; C. Leadership; D. Organization; E. Participation; F. Feedback;

XX. MSTP Physician-Scientist Speaker Series

XXI. MSTP Retreat
   A. Attendance; B. Research Presentations; C. Abstracts

XXII. MSTP Leadership Workshop

XXIII. MSTP Career Development Workshop

XXIV. MSTP Data Club

XXV. Wellness Resources

XXVI. Meharry-Vanderbilt Alliance
   A. Meharry Medical College; B. Meharry-Vanderbilt Alliance; C. Vanderbilt-Meharry Programming for
   MD/PhD Students

XXVII. Contacts
   A. MSTP Leadership Team; B. MSTP Advising College Leaders; C. MSTP Senior Oversight Committee;
   D. MSTP Faculty Advisory Committee; E. MSTP Student Advisory Committee F. Directors/Chairs of
   Ph.D. Degree Granting Departments and Programs; G. Directors of Graduate Studies

XXVIII. Current Students (Including Mentors and Graduate Research Departments)

XXIX. Departmental Coursework and Requirements for the Ph.D.
I. Introduction

A. Program Goals and Overview

The central goal of the MSTP at Vanderbilt is to train leaders in biomedical research and human medicine. At the heart of our MSTP is the conviction that the approach to problem solving acquired during Ph.D. training, i.e., the seeking of new information from a sound foundation in a particular discipline, is the most productive pathway for first-rate medical scientists. We provide students with an integrated curriculum comprising a strong core education in medicine, intensive training in scientific inquiry, and numerous opportunities in leadership and teamwork. We think that this approach has been successful as 72% of our graduates have established careers in academic medicine or biomedical research. The Vanderbilt MSTP builds on the existing strengths of Vanderbilt University to meet national needs for a well-trained physician-scientist workforce.

Clinical experiences are offered to graduate-phase students through a clinical preceptorship program. Students work with clinical mentors from internal medicine and pediatrics to maintain and enhance clinical skills acquired prior to the initiation of graduate studies. The MSTP also supports a physician-scientist speaker series and an annual retreat. Leadership and Career Development workshops are offered in alternating years.

B. MSTP Training Grant

A training grant from the NIH supports about 20% of the expenses for the MSTP; the remainder comes from the Dean’s office, basic science and clinical departments, and philanthropy. The MSTP training grant is the largest training grant at Vanderbilt. The grant will support 22 students in academic year 2014-2015. The current version of the training grant is funded through June 2019.

C. Program Outcomes

The most important outcome of a training program is the success of its graduates. As of June 2014, 219 students have completed the MSTP at Vanderbilt. Sixty-three graduates are in residency or fellowship training, 150 have established careers, five are retired, and one is deceased. Of the 150 graduates with active careers, 95 (63%) are in academic positions (21 professors, 22 associate professors, 37 assistant professors, 14 clinical instructors, and one in secondary science education), 13 (9%) are employed in private-sector or government research, and 42 (28%) are in private practice. The 63 graduates still in training are at excellent institutions. Three of our Vanderbilt institutional leaders, Dr. Jeff Balser, Vice Chancellor for Health Affairs, Dr. Sam Santoro, Chair of Pathology, Microbiology, and Immunology, and Dr. Christopher Williams, Director, Physician-Scientist Training Program, are graduates of the Vanderbilt MSTP. We also have a number of graduates in key leadership positions in other academic medical settings and research across the country.
D. Program Personnel

Dr. Terence S. Dermody, Dorothy Overall Wells Professor of Pediatrics and Pathology, Microbiology, and Immunology and Director of the Division of Pediatric Infectious Diseases, serves as Director of the Vanderbilt MSTP. Dr. Dermody came to Vanderbilt in 1990 after completing a residency in internal medicine at Presbyterian Hospital in New York and fellowships in infectious diseases and virology at Brigham and Women’s Hospital and Harvard Medical School in Boston. Dr. Dermody is a physician-scientist with clinical interests in pediatric infectious diseases and research interests in viral pathogenesis. He serves as course director for the MSTP Seminar Series and facilitates the Leadership Workshop. He joined the MSTP in 2002 and was appointed the director in 2003.

Dr. Danny G. Winder, Professor of Molecular Physiology and Biophysics and Psychiatry, serves as Associate Director of the MSTP. Dr. Winder received his Ph.D. degree at Emory University and completed postdoctoral training at Columbia. He joined the faculty of the Department of Molecular Physiology and Biophysics (MPB) in 1999. He also is a member of the Vanderbilt Brain Institute and Neuroscience Graduate Program. Dr. Winder’s research is focused on addiction biology and synaptic plasticity. Dr. Winder oversees student selection of laboratory rotations, coordinates the MSTP Retreat, and provides leadership for the MSTP Advising Colleges. He also has primary responsibility for Responsible Conduct of Research Training for all MSTP students. He joined the Vanderbilt MSTP in October, 2013.

Dr. Sally J. York, Assistant Professor of Medicine in the Division of Hematology and Oncology, serves as Associate Director of the MSTP. Dr. York earned her M.D. and Ph.D. degrees from Washington University in St. Louis and completed internal medicine and hematology/oncology training at Duke University. Dr. York’s research interests focus on the recognition and processing of chemotherapy-induced DNA damage by DNA mismatch repair, a genomic stability pathway defective in many sporadic and familial tumors. She provides supervision for the MSTP Clinical Preceptorship Program, MSTP Continuity Clinical Experience, and MSTP Career Development Workshop. She joined the Vanderbilt MSTP in July, 2014.

Dr. Michelle M. Grundy, Assistant Professor of Medical Administration, serves as Assistant Director of the MSTP. Dr. Grundy earned her Ph.D. in 2000 from the Department of Microbiology and Immunology at Vanderbilt. She is responsible for MSTP student recruitment and coordinates the admissions process and finances. Dr. Grundy joined the MSTP in 2002.

Dr. James L. Bills, Assistant Professor of Medical Education and Administration, serves as Assistant Director of the MSTP. Dr. Bills earned his Doctorate of Education in 2005 from Tennessee State University and a Master of Science degree from the University of Southern Mississippi. He provides administrative leadership for the MSTP curriculum and post-matriculation programming. Dr. Bills joined the MSTP in 2008.

Ms. Melissa S. Krasnove serves as Program Coordinator of the MSTP. Ms. Krasnove earned her Master of Education degree from Loyola University Chicago. She is responsible for supporting all aspects of the MSTP, including the admissions process and post-matriculation activities. Ms. Krasnove joined the MSTP in 2010.
II. History of the MSTP at Vanderbilt

In the late 1950s, Dr. James Shannon, then Director of the NIH, urged Congress to appropriate funds for the establishment of programs designed to combine M.D. and Ph.D. training. Dr. Shannon suggested to the Vanderbilt School of Medicine Dean John B. Youmans that Vanderbilt could be a model for such a dual-degree program. In 1964, the School of Medicine restructured its curriculum for medical students to allow electives, including research, in which students could pursue individual areas of interest not covered in the core curriculum. The availability of elective time made it possible for students to take Graduate School courses during the regular Medical School year. These courses were combined with a rigorous research experience, resulting in the first combined M.D. and Ph.D. degrees at Vanderbilt.

The Vanderbilt M.D./Ph.D. program was initially supported by various local means, such as small gifts and foundation grants. A significant base was established in 1968 when the Vivian B. Allen Foundation permanently endowed the program with a $1 million gift. In 1977, the University first received support from the NIH (GM07347) for a dual-degree program, leading to the formal establishment of the MSTP. This support enabled the program to fund three new students per year for each of five years. The program did not reach critical mass, and an application in 1981 for continued support was not approved. Dr. John Exton then became Program Director and submitted a revised application that was funded in 1984. Dr. Daryl Granner succeeded Dr. Exton and served as Director from 1986 to 1993, overseeing an expanded program to a steady-state of 45 students. In 1993, Dr. David Robertson became Director and further expanded the program to 60 students. Dr. Terence Dermody became Director in 2003. The program now includes 102 students.

III. MSTP Curriculum

A. Medical and Graduate Training

The MSTP is a joint endeavor between the Vanderbilt University School of Medicine and the Vanderbilt University Graduate School. Trainees are required to fulfill all of the requirements for both the M.D. and Ph.D. degrees. The MSTP allows for alternating enrollment in the School of Medicine and the Graduate School. MSTP trainees usually complete the first two years of the medical curriculum prior to the initiation of research training.

The cornerstone of the Vanderbilt MSTP is graduate training in science afforded by a vigorous Ph.D. experience. Our goal is for each MSTP student to be provided intensive training in scientific inquiry using a preceptor-oriented, problem-solving approach. We think this approach is the most effective way to educate and train innovative medical scientists.

Following completion of at least two laboratory rotations, trainees select a laboratory and department for graduate studies. This selection is formalized in the semester prior to the transition to graduate research training. Requirements for successful completion of the Ph.D. degree are the same for all students at Vanderbilt. The Ph.D. thesis must be successfully defended prior to reentry into Medical School. The program for the entering class of 2014 is provided on page 9.
B. The MSTP-Clinical Investigation Track

To facilitate the training of clinical investigators, we developed a distinct track within the Vanderbilt MSTP called the MSTP-Clinical Investigation Track (MSTP-CIT). The goal of the MSTP-CIT is to provide comprehensive training in science for physician scientists engaged in translational and patient-oriented research. This program is intended for students who enter the MSTP after the second year of Medical School or during the later stages of residency or fellowship. Information about the MSTP-CIT is contained in Section V.

IV. Medical Curriculum 2.0

The MSTP at Vanderbilt provides integrative training in medicine and science. In the newly revised Curriculum 2.0, most MSTP trainees will complete the first two years of Medical School, pursue graduate studies in a rigorous doctoral program for three to four years, and return to Medical School to complete the final year of clinical training. The program is sufficiently flexible to allow alternative training plans. For example, an occasional MSTP student may complete Ph.D. training following the M1 year. Conventional M.D. students who enter the MSTP following the M3 year will complete Ph.D. training at that time. An overview of the MSTP academic program for 2014-2015 is provided in the figure on page 9.

A. The Foundations of Medical Knowledge

The first phase of the curriculum, Foundations of Medical Knowledge, provides a broad foundation of knowledge and skills in normal and abnormal human biology. The Foundations of Medical Knowledge year incorporates an organ-systems approach to present the core basic science content. Multiple learning methodologies, including teamwork around structured cases, are used to promote integration and application of new information. Subsequent years of training build on this foundation, with escalating detail as students advance. The intent is to focus on conceptual understanding and promote better retention of information. Content within the Foundations of Medical Knowledge year serves as the basis for initiation of Ph.D. thesis research. Accordingly, Graduate School credit is provided for MSTP students in a discipline-specific fashion.

B. The Foundations of Clinical Care (FCC) Year

The second phase of the curriculum, Foundations of Clinical Care, provides education in multiple medical disciplines via clerkships in medicine, neurology, obstetrics and gynecology, pediatrics, psychiatry, and surgery. There are also opportunities for students to pursue clinical electives.

C. Foundations of Biomedical Research

The Foundations of Biomedical Research (FBR) course was developed for FMK year (FBR Phase I) and FCC year (FBR Phase II) MSTP students. The goal of the course is to prepare MSTP students for the research phase of training. The course objectives are to develop skills for physician-scientist trainees in critical evaluation of research literature and formulating high-
impact research questions. For students in the FMK year, the focus is on developing critical-thinking skills and fostering scientific creativity. Practical advice is provided for selecting a thesis mentor. For students in the FCC year, the course is tailored to the interests of individual students and mentors, with emphasis on examining scientific papers foundational to the students’ field of research. Students meet in small groups organized by class year. The discussions are facilitated by two members of the MSTP training faculty, Dr. Danny Winder, Professor of Molecular Physiology and Biophysics and Associate Director of the MSTP, serves as FBR course director along with Dr. Amy Major, Assistant Professor of Medicine and Pathology, Microbiology, and Immunology.

Vanderbilt MSTP Curriculum – Academic Year 2014-2015

D. Immersion Year

The Immersion phase is a highly individualized period that allows students to build on prior foundational knowledge in a context relevant to each student’s interests. Immersion courses incorporate teaching of the scientific, ethical, legal, and social dimensions of medicine, frequently in the context of delivering clinical care. Students can select from a broad menu of courses to complete core requirements and pursue individual interests.

Most MSTP students enter the final Immersion (M3) year in July with the rising third-year Medical School class. However, our program is sufficiently flexible to allow students to begin the M3 year at any time during the academic year. MSTP students returning after September 1 must complete a minimum of six months of clinical electives. If more time is available, MSTP students can take additional clinical electives or conduct research. Each student should be aware that there may be difficulties associated with an entry later than October, including residency
application deadlines and completion of the USMLE Step 2 examination. In addition, failure to complete requirements within this limited time frame may result in a delay in graduation.

MSTP students, having completed an intensive research experience during the Ph.D. phase, will be exempt from additional research requirements during the immersions curriculum and are encouraged to focus on increasing knowledge in a specific clinical specialty.

E. Foundations of Healthcare Delivery

All students will assume meaningful roles in a longitudinal continuity clinical experience in the first year that will evolve throughout their training. Experiences in clinic will stimulate a “need to know,” promoting curiosity and making the relevance of other coursework more apparent. A longitudinal experience in a specific setting will allow students to observe and ultimately influence the effect of systems science on patient outcomes. Early and active clinical work will foster formation of professional identity. After MSTP students transition to the graduate phase of training, they will remain in a clinical preceptorship program specifically tailored to the needs of physician-scientist trainees.

V. Graduate Training

A. Graduate School Training

The cornerstone of the Vanderbilt MSTP is training in scientific inquiry afforded by a rigorous Ph.D. experience. MSTP trainees select a laboratory and department for graduate studies before the end of the M2 year. Training is individualized and guided by a faculty mentor in an MSTP-affiliated department or program. Requirements for successful completion of the Ph.D. degree are the same for all students at Vanderbilt. The Ph.D. dissertation must be completed and successfully defended before the student is permitted to resume medical training. The requirements for successful completion of the Ph.D. degree are the same for all students at Vanderbilt. The Ph.D. thesis must be successfully defended prior to reentry into Medical School. Course requirements for each of the Ph.D.-degree granting departments and programs can be found in Section XXVIII.

Seven Ph.D.-granting departments in the School of Medicine are presently affiliated with the MSTP: Biochemistry, Biomedical Informatics, Cancer Biology, Cell and Developmental Biology, Molecular Physiology and Biophysics, Pathology, Microbiology and Immunology, and Pharmacology. An additional six Ph.D.-degree granting departments and programs affiliated with the MSTP include the Department of Biological Sciences in the College of Arts and Science, the Department of Biomedical Engineering of the School of Engineering, the Chemical and Physical Biology Program, the Program in Epidemiology, the Program in Human Genetics, and the Program in Neuroscience. More information about participating departments and programs is provided in individual websites.

The Vanderbilt MSTP incorporates more than 200 faculty participants from Vanderbilt University and Meharry Medical College. Criteria used for selection of Vanderbilt faculty to serve as MSTP preceptors include: (1) membership in a department or program affiliated with
the Vanderbilt University Graduate School, (2) an established research program with peer-reviewed funding, (3) evidence of commitment to graduate training, and (4) approval by the department chair or program director to train graduate students. Research interests and departmental affiliations are provided on the BRET website at https://medschool.vanderbilt.edu/bret/.

B. Requirements

MSTP trainees must complete all requirements of the Graduate School for the Ph.D. degree. This includes 72 hours of graduate credit, of which at least 24 hours must be derived from formal courses and didactic seminars. Students must maintain a “B” average in coursework to remain in good academic standing. Following completion of coursework, students must pass a qualifying exam. Although the composition of this exam varies by department/program, it tests the trainees’ knowledge and skills necessary for a career in scholarly research.

C. Ph.D. Thesis

The culmination of graduate training is the preparation and public defense of a dissertation. The dissertation must describe an original investigation that significantly advances knowledge in the field of study. Both the qualifying exam and dissertation defense are administered by a faculty committee, which consists of no fewer than five members of the Graduate School faculty with at least one member from another Graduate School department/program. In addition, at least one member of the MSTP FAC is included on the thesis committees of MSTP trainees. A major criterion for acceptability of the dissertation is the determination of whether the principal findings are acceptable for publication in a peer-reviewed journal. In practice, most of our students publish several peer-reviewed manuscripts.

D. Change of Mentors

On rare occasions, an MSTP student may choose to change research mentors during the period of graduate training. Such decisions may reflect a change in the student’s scientific interests or lack of an interpersonal fit with the initial mentor and laboratory. Decisions to change research mentors are carefully reviewed by the MSTP Leadership Team and the appropriate departmental Director of Graduate Study. The program is sufficiently flexible to accommodate a request to change research mentors if that is the best option for the student to complete graduate training. Students should contact the Leadership Team if considering a change in mentors.

E. Graduate Credit Hours

The MSTP, the Graduate School, and participating biomedical research departments and programs allow courses taken during the FMK year to be transferred to the Graduate School transcript for both didactic credit and research hours. When the student has requested a mentor and department for his or her graduate studies, and the mentor has been approved by the MSTP Leadership Team, the MSTP will coordinate the transfer of credit hours to the Graduate School transcript in the summer after completion of the FMK year.

The Graduate School requires 72 hours for the Ph.D. degree, and the majority of the biomedical research departments require this number of hours. By prior agreement, up to 48 hours of Vanderbilt University School of Medicine coursework may be transferred to the Graduate School
and counted toward the 72 hour requirement. The MSTP will pay the tuition for the remaining 24 hours.

The departmental Directors of Graduate Study play an important role in advising students about department-specific coursework and requirements for graduate training. Please contact these individuals for information about departmental course offerings and guidelines. A summary of departmental course requirements is provided in Section XXVIII.

MSTP trainees spend much of their first year in Graduate School taking required graduate courses and preparing for their Ph.D. qualifying exam. They also initiate their dissertation research, which continues for a total of 3 to 4 years in most cases. Importantly, the dissertation must be completed and successfully defended before the student resumes medical training.

VI. MSTP-Clinical Investigation Track (MSTP-CIT)

A. Introduction

The application of fundamental scientific discoveries to improvements in human health requires physician-scientists trained in translational and patient-oriented research. Methodologies employed in this research include design of clinical trials, ethics of research using human subjects, biostatistics, and regulatory principles. While a Master of Science in Clinical Investigation provides expertise in the basic technologies involved in translational and patient-oriented research, this program of study may not provide sufficient time for comprehensive training in discovery-based and hypothesis-driven inquiry and acquisition of in-depth knowledge of a particular scientific discipline.

To facilitate the training of clinical investigators, we have developed a distinct track within the Vanderbilt MSTP called the MSTP-Clinical Investigation Track (MSTP-CIT). The goal of the MSTP-CIT is to provide comprehensive training in science for physician-scientists engaged in translational or patient-oriented research. Successful completion of the MSTP-CIT will lead to a Ph.D. degree.

B. Program Overview

Students can enter the MSTP-CIT either after the second year of Medical School or during the later stages of residency or fellowship. Under special circumstances, MSTP students in the G-phase of training can enroll in the MSTP-CIT. MSTP-CIT students must complete all of the required Graduate School coursework, form a thesis committee, pass a qualifying exam, and defend the oral and written components of a Ph.D. thesis. Trainees who complete graduate training after the M3 year reenter Medical School to complete the M4 year and graduate with both M.D. and Ph.D. degrees. Trainees who complete graduate training after residency or fellowship will receive a Ph.D. and begin independent faculty positions at Vanderbilt or elsewhere. The MSTP-CIT will enroll two to four students each year.

MSTP-CIT trainees will be required to participate in all components of the curriculum intended for M.D./Ph.D. students at Vanderbilt. These include the weekly MSTP Seminar Series, the
monthly MSTP Data Club, the annual MSTP retreat, and the biennial MSTP Career Development and Leadership Workshops. MSTP-CIT trainees will be assigned to MSTP advising colleges and participate in all advising activities developed for MSTP students.

C. Graduate Coursework

MSTP-CIT trainees must complete all of the requirements of the Graduate School for the Ph.D. degree. Like conventional MSTP students, MSTP-CIT students must complete 72 hours of graduate credit, of which 24 hours must be derived from formal courses and didactic seminars. All MSTP-CIT students will be required to take the MSTP Seminar. Predoctoral MSTP-CIT students also will be required to participate in the MSTP Clinical Preceptorship program.

Each Ph.D. degree-granting department or program offers graduate courses that are appropriate for MSTP-CIT students (see Compass Section XXVI). In addition, MSTP-CIT students must take the MPH/MSCI courses in biostatistics, study design, and ethics as electives. Departmental requirements for didactic coursework for MSTP-CIT students are identical to those for other Ph.D. students. Departmental Directors of Graduate Study can answer any questions about department-specific coursework and departmental requirements for graduate training.

D. Rotations

Laboratory rotations enable students to select a thesis laboratory and enhance technical and leadership skills. MSTP-CIT students must complete a minimum of two laboratory rotations before choosing a preceptor and graduate department or program for the dissertation research. A research project in the concentration areas of laboratory-based biomedical research, patient-oriented research, or biomedical informatics during Medical School will meet the requirement for two laboratory rotations. If desired, an additional three-four week rotation may be completed at the beginning of the graduate phase of training.

E. Mentors for MSTP-CIT Students

Faculty members affiliated with any of the Ph.D. degree-granting departments or programs, who have approval from the departmental chair for training graduate students, are eligible to serve as mentors for MSTP-CIT students. MSTP-CIT students must choose a mentor or co-mentor with an established translational or patient-oriented research program. The mentor list can be found at: [http://bret.mc.vanderbilt.edu/mstp/php_files/faculty_listing.php](http://bret.mc.vanderbilt.edu/mstp/php_files/faculty_listing.php).

Procedures for choosing a Ph.D. thesis mentor and department for MSTP-CIT students are identical to those used for conventional MSTP students. In addition to discussing the mentor and department choice with his or her MSTP advisor and either the MSTP Director or Associate Director, MSTP-CIT students must meet with Dr. Katherine Hartmann, Associate Dean for Clinical and Translational Scientist Development.

F. Funding for the MSTP-CIT

MSTP-CIT students will receive a tuition scholarship and stipend to cover expenses for graduate training. Predoctoral MSTP-CIT students will receive a tuition scholarship and stipend for all Medical School years after acceptance into the MSTP. Funding will be provided by the program
for the G1 and immersion years. Funding for the remaining years will be provided by individual or institutional training grants or grants used to support the mentor’s research. Postdoctoral MSTP-CIT students who enter the program after residency or fellowship also may be supported by the K12 portion of the NIH Clinical and Translational Science Award. The MSTP-CIT will not be able to cover the costs of medical training completed prior to entering the program. The NIH has developed several programs to assist in repayment of loans incurred for the education of physician-scientists. MSTP-CIT trainees should be very competitive candidates for these loan repayment programs.

G. Applications to the MSTP-CIT

Applicants for the MSTP-CIT must submit an American Medical College Application Service (AMCAS) application (for predoctoral students) or a residency application (for postdoctoral students), a medical school transcript, and three letters of recommendation. Recommendation letters should comment specifically on research experiences and career goals of the applicant. Applications are due February 1 of the year in which graduate training is anticipated to begin. Procedures used to interview and select applicants for the MSTP-CIT are identical to those used for conventional MSTP students.

VII. Laboratory Rotations

A. Rotation Purpose

The purpose of a laboratory rotation for MSTP students is to determine whether the laboratory is a suitable environment for graduate biomedical research. This means assessing whether the laboratory is a good fit for the student’s research skills and aptitude and, likewise, whether the student possesses the requisite skills for research in a particular laboratory environment. The student does not necessarily require a formal project with clearly defined objectives for a rotation to be a success. Rather, the mentor and student will design the rotation to allow an appropriate assessment of the laboratory and the student.

Although the length of a rotation may only be three to four weeks, rotation periods are generally free of other academic responsibilities. Thus, MSTP students should be able to devote sufficient time in laboratory to ensure objectives are met.

B. Rotation Requirements

Each MSTP student must complete two laboratory rotations before choosing a preceptor and graduate department or program for the dissertation. Some students may elect to pursue a third or even a fourth laboratory rotation before choosing a research mentor.

Each rotation has a defined interval, but there is flexibility around the start and stop dates. In general, the minimum length for a rotation is three-four weeks. In most cases, the first rotation is from mid-June to mid-July, ending prior to the start of the FMK year orientation. The second rotation is from July to August between the FMK and FCC years. A third rotation, if necessary, will begin following completion of the USMLE Step I examination.
Students have the option of extending rotations as the academic schedule allows. Extensions of rotations may be arranged with the approval of the laboratory mentor and the MSTP leadership. Two rotations are required. Although a student may be confident that he or she has found a thesis research laboratory after the first rotation, the second rotation can be used to cement their choice, learn a new scientific technique, and gain exposure to another laboratory leadership style.

C. Mentor Eligibility and Listing

To be eligible to serve as mentors for MSTP students, faculty members must be affiliated with one of the Ph.D. degree-granting departments or programs, have been approved by their departmental chair to train graduate students, and are eligible to serve as mentors for MSTP students. The mentor list can be found at https://medschool.vanderbilt.edu/bret/faculty.

D. Mentor Guidelines

According to NIH guidelines, research mentors should not supervise more than two MSTP students for dissertation research. To identify potential preceptors, students should use the information available on the BRET website, the MSTP Leadership Team, their MSTP advisor, departmental Directors of Graduate Study, current MSTP and graduate students, and the department/program orientation days and poster sessions. Meetings with potential preceptors should be arranged to discuss rotation and thesis projects and mentor expectations. Commitments for rotations should not be arranged directly between the preceptor and the student. Rotation placements will be coordinated through the rotation request mechanism described below.

If at any point during a rotation a student determines that the preceptor is not a good fit for the potential thesis work, the MSTP Leadership Team should be contacted. Provisions will be made to facilitate a new rotation selection.

E. Rotation Requests

MSTP students are required to contact Dr. Danny Winder, MSTP Associate Director, to discuss potential mentors prior to contacting mentors directly. After discussing the mentor list with Dr. Winder, students should contact potential mentors to discuss whether the mentors would be willing to accept the student for a laboratory rotation, a defined rotation project, rotation dates, and any expectations about the time to be committed to laboratory work. Students should not commit to a rotation in a laboratory without first having the approval of the MSTP Leadership Team.

Students submit requests for rotation mentor assignment to the Leadership Team (through Dr. Bills). The request should include at least three potential preceptors, listed in order of preference. A short rationale for the choices is to be provided (3-4 lines each will suffice). The rationale can include information about the lab research interests and environment and how the lab would fulfill the student’s training goals. Students with questions about potential laboratory rotation mentors are strongly encouraged to contact Dr. Winder for information and advice.

Rotation requests are due by the following dates:
Rotation 1 (mid-June to mid-July prior to M1): June 1
Rotation 2 (July to August following the FMK year): May 15

The MSTP Leadership Team will review each student’s requests and make assignments based on priority, availability, and student research interests. If the choices are submitted by the due dates, every effort will be made to ensure that the student is offered a first-choice selection, if not for the given rotation, then for a future rotation. After approval of the rotation request, the mentor will be contacted by email to confirm rotation details, with copies of this correspondence provided to departmental chairs, DGSs, and coordinators. When the mentor confirms and, if no objections from the chair, the student will be notified. Arrangements for subsequent rotations should be discussed as soon as possible with the MSTP Leadership Team.

F. Student Rotation Responsibilities

1. Laboratory rotation expectations

Prior to each rotation, the student and mentor should meet to discuss the rotation project and expectations about the time to be committed to laboratory work. Adherence to the following general guidelines will allow satisfactory progress to be made in each of the laboratory rotations.

Rotations are scheduled at a time when there are few if any academic responsibilities. During these rotations, students are expected to spend the requisite amount of time to meet the goals of the rotation experience, at least 40 hours per week, with the specific expenditure of time to be determined by the nature of the project and the mentor’s expectations.

2. Rotation evaluations and summaries

Students are required to evaluate the laboratory rotation experience using an evaluation form that will be provided toward the end of each rotation. This information will be reviewed by the Leadership Team. In addition, a brief rotation summary consisting of background, objectives, methods and materials, results, and conclusions will be provided to Dr. Bills one week following the conclusion of the rotation. The summary should be prepared in consultation with the preceptor. Each rotation summary will be submitted to the NIH as an integral part of the annual MSTP progress report.

G. Preceptor Rotation Responsibilities

Rotation preceptors are required to evaluate student performance in the laboratory during the rotation. Dr. Bills will contact mentors to provide procedures for completing the evaluation form.
VIII. Declaring a Graduate Department

A. Choosing a Thesis Mentor

Prior to choosing a laboratory for thesis research, each MSTP student must complete at least two rotations according to the MSTP rotation policy. Before making a final decision about a mentor for the thesis research, students must discuss their choice of mentor with his or her MSTP advisor and either the MSTP Director or Associate Director. Each student should maintain a relationship with his or her intended mentor during the interim period between informally selecting the mentor and formally commencing thesis work. This relationship may include research or reading electives in the interval between the rotation and beginning full-time graduate research.

In cases where the thesis research mentor has not previously trained a PhD-degree seeking student, a more senior co-mentor should be identified in order to provide guidance as required throughout the training process.

B. Being Assigned a Thesis Mentor

Once a student has decided on a thesis mentor, it is his or her responsibility to initiate contact with the mentor. Together, the student and mentor must draft a letter to the MSTP Director (to be sent to Dr. Bills) requesting admission to the chosen laboratory and department of study. The department of study may be either the mentor’s primary or secondary department of appointment. The letter should include a brief description of the graduate training (i.e., required course work and qualifying examination format) and a summary of the specific aims of the graduate research. In addition, the letter must include the following sentence: “This arrangement for graduate studies has the approval of the mentor’s department chair.”

A copy of the letter will be sent to the Department Chair and the Director of Graduate Study (with a copy to the program coordinator) for the requested department of study. The request letter may be a signed hard copy or emailed to Dr. Bills without signatures as long as the mentor, DGS, and Department Chair have been made aware of the student’s request to join a mentor and program of study.

The MSTP Leadership Team will review the training plan developed by the student and mentor. If the mentor and training plan are deemed appropriate, the choice of mentor will be approved by the MSTP, and a letter will be prepared for the mentor, with copies to the DGS and the chairs of the mentor’s primary and secondary appointed departments. Some departments employ an independent approval process for accepting new students, including MSTP students, for Ph.D. dissertation research. Departmental directors of graduate study can clarify the approval process used by each department.

Letters requesting admission to a particular laboratory should be submitted at a date provided by the MSTP Leadership Team unless additional rotations are necessary. However, students may submit these letters as soon as a decision is made regarding the mentor and program of study. If subsequent rotations are required beyond the minimum of two, these letters should be submitted as soon as possible after the decision has been made to join a mentor and program. The key
requirement is that the student should continue to communicate with the Leadership Team during this process, in particular the Associate Director.

C. Multiple Students and One Mentor

Two students rotating with the same mentor at the same time may be approved if safeguards are in place to ensure that each student has a well-defined independent project and there is no conflict regarding supervision. The MSTP Leadership Team must approve this situation. In the event of a laboratory choice conflict of this nature, that is, two students who may wish to join the same lab for graduate training, the student should discuss possible mentors with either the Director or Associate Director. The advising team will work with those involved to resolve any potential conflicts.

IX. Mentor Selection Criteria: Questions for Careful Consideration

A. Laboratory Environment

1. Is the lab an open and engaging intellectual environment with discussion about:
   a. the quality of the questions addressed? b. alternative experimental approaches?
   c. interactions with other investigators? d. alternative interpretations of data?

2. Is the lab “networked” with leaders in the field, with access to critical reagents, methods, and early information about publication results?

3. Are lab members willing to provide technical help? Are these individuals accessible during the work day?

4. Are quality standards maintained at a high level for lab maintenance, management, and verification of results? Is the lab organized and is it easy to accomplish quality experiments there?

5. Are frequent lab meetings held to present critical papers in the field and progress of ongoing experiments? Do lab members help one another in evaluating data? Is a constructive, critical attitude about data welcome?

6. How do current students in the laboratory perceive the laboratory environment?

7. What are the training outcomes of the laboratory? What types of training pathways and careers are chosen by previous students following completion of graduate studies?

B. Mentoring and the Mentoring Relationship

1. Is the mentor active in mentoring? Is the mentor accessible, generous with time, aware of experimental problems and approaches in progress? Does the mentor review primary data in an open and engaged way?
2. How actively does the mentor integrate the projects in the lab? Are individual boundaries well defined and comfortable?

3. Is the relationship with the mentor a constructive one? Do meetings stimulate discussion and lead to new ideas and approaches?

4. How good is the mentor at trouble shooting or directing students to sources of help?

5. Is the relationship with the mentor empowering? Are students capable of developing independent skills, quality thresholds, reagents, and approaches in the lab?

6. How effectively are students stimulated to assemble an individual database of information about potential projects and to develop ideas in conjunction with the mentor? Are students highly motivated to pursue the questions the lab is addressing? Do students actively participate in the definition of the project, or is student participation passive?

C. The AAMC Compact

The Association of American Medical Colleges has developed the following guiding principles that are intended to support the development of a positive mentoring relationship between the pre-doctoral student and their research advisor. The Compact was prepared by the AAMC Group on Graduate Research, Education, and Training (GREAT). Excerpted below are student and mentor commitments to research training. The complete document is available on the AAMC Web site at https://www.aamc.org/initiatives/gradcompact/

1. Commitments of graduate students

- I acknowledge that I have the primary responsibility for the successful completion of my degree. I will be committed to my graduate education and will demonstrate this by my efforts in the classroom and the research laboratory. I will maintain a high level of professionalism, self-motivation, engagement, scientific curiosity, and ethical standards.

- I will meet regularly with my research advisor and provide him/her with updates on the progress and results of my activities and experiments.

- I will work with my research advisor to develop a thesis/dissertation project. This will include establishing a timeline for each phase of my work. I will strive to meet the established deadlines.

- I will work with my research advisor to select a thesis/dissertation committee. I will commit to meeting with this committee at least annually (or more frequently, according to program guidelines). I will be responsive to the advice of and constructive criticism from my committee.
- I will be knowledgeable of the policies and requirements of my graduate program, graduate school, and institution. I will commit to meeting these requirements, including teaching responsibilities.

- I will attend and participate in laboratory meetings, seminars and journal clubs that are part of my educational program.

- I will comply with all institutional policies, including academic program milestones. I will comply with both the letter and spirit of all institutional safe laboratory practices and animal-use and human-research policies at my institution.

- I will participate in my institution’s Responsible Conduct of Research Training Program and practice those guidelines in conducting my thesis/dissertation research.

- I will be a good lab citizen. I will agree to take part in shared laboratory responsibilities and will use laboratory resources carefully and frugally. I will maintain a safe and clean laboratory space. I will be respectful of, tolerant of, and work collegially with all laboratory personnel.

- I will maintain a detailed, organized, and accurate laboratory notebook. I am aware that my original notebooks and all tangible research data are the property of my institution but that I am able to take a copy of my notebooks with me after I complete my thesis/dissertation.

- I will discuss policies on work hours, sick leave and vacation with my research advisor. I will consult with my advisor and notify fellow lab members in advance of any planned absences.

- I will discuss policies on authorship and attendance at professional meetings with my research advisor. I will work with my advisor to submit all relevant research results that are ready for publication in a timely manner prior to my graduation.

- I acknowledge that it is primarily my responsibility to develop my career following the completion of my doctoral degree. I will seek guidance from my research advisor, career counseling services, thesis/dissertation committee, other mentors, and any other resources available for advice on career plans.

2. Commitments of research advisors

- I will be committed to the life-long mentoring of the graduate student. I will be committed to the education and training of the graduate student as a future member of the scientific community.

- I will be committed to the research project of the graduate student. I will help to plan and direct the graduate student’s project, set reasonable and attainable goals, and establish a timeline for completion of the project. I recognize the possibility of conflicts between the interests of externally funded research programs and those of the graduate student, and will not let these interfere with the student’s pursuit of his/her thesis/dissertation research.
- I will be committed to meeting one-on-one with the student on a regular basis.

- I will be committed to providing financial resources for the graduate student as appropriate or according to my institution’s guidelines, in order for him/her to conduct thesis/dissertation research.

- I will be knowledgeable of, and guide the graduate student through, the requirements and deadlines of his/her graduate program as well as those of the institution, including teaching requirements and human resources guidelines.

- I will help the graduate student select a thesis/dissertation committee. I will assure that this committee meets at least annually (or more frequently, according to program guidelines) to review the graduate student’s progress.

- I will lead by example and facilitate the training of the graduate student in complementary skills needed to be a successful scientist, such as oral and written communication skills, grant writing, lab management, animal and human research policies, the ethical conduct of research, and scientific professionalism. I will encourage the student to seek opportunities in teaching, if not required by the student’s program.

- I will expect the graduate student to share common laboratory responsibilities and utilize resources carefully and frugally.

- I will not require the graduate student to perform tasks that are unrelated to his/her training program and professional development.

- I will discuss authorship policies regarding papers with the graduate student. I will acknowledge the graduate student’s scientific contributions to the work in my laboratory, and I will work with the graduate student to publish his/her work in a timely manner prior to the student’s graduation.

- I will discuss intellectual policy issues with the student with regard to disclosure, patent rights and publishing research discoveries.

- I will encourage the graduate student to attend scientific/professional meetings and make an effort to secure and facilitate funding for such activities.

- I will provide career advice and assist in finding a position for the graduate student following is/her graduation. I will provide honest letters of recommendation for his/her next phase of professional development. I will also be accessible to give advice and feedback on career goals.

- I will provide for every graduate student under my supervision an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment.

- Throughout the graduate student’s time in my laboratory, I will be supportive, equitable, accessible, encouraging, and respectful. I will foster the graduate student’s professional confidence and encourage critical thinking, skepticism and creativity.
D. Traits of a Successful Ph.D.

The British Research Councils developed threshold standards and competencies that they thought any Ph.D. student should develop during training. Though the United States has not developed such competencies for training scientists, the British list is instructive insofar as providing students and mentors with specific objectives for Ph.D. training. An abridged list of Ph.D. competencies is provided below.

- Demonstrate original, independent, and critical thinking.
- Justify the principles and experimental techniques used in research.
- Show a broad understanding of the context in which research is carried out.
- Effectively manage a project and use information appropriately.
- Constructively defend research outcomes.
- Articulate ideas clearly to a range of audiences.
- Develop and maintain working relationships.
- Take ownership for his or her career progression.
- Demonstrate an insight into transferable skills (e.g., leadership, teamwork, writing, and teaching).

X. Registration

A. Medical School and Graduate School

Registration for the Medical School or the Graduate School is required each semester, including the summer term. Formal registration maintains student status and provides for exemption from FICA/Medicare payments as a trainee and continued deferral of any previous student loans. The Medical School registrar will register all students enrolled in VUSM. Each student is responsible for registering in the Graduate School through the university registration system (YES). A few departments or programs may enroll their students within that particular department or program, therefore, students should contact the program coordinator to determine registration procedures. This will first occur during the spring semester prior to matriculating to Graduate School. Contact Ms. Krasnove if you have any questions about registration procedures.

B. MSTP Seminar Series

All MSTP students are required to attend the MSTP Seminar Series during all years of participation in the program, except the FCC and immersions years. Students enrolled in the Medical School will be registered for the course by the VUSM Registrar. Graduate students should register themselves if the course is offered for credit in their individual department or program. Even if the MSTP student is not taking the course for credit, attendance is required.

C. Responsible Conduct of Research

All MSTP students are required to complete training in the Responsible Conduct of Research (RCR). The training will be offered in two modules. The first module (Phase I) will be offered in two four-hour sessions during the first two weeks the MSTP curriculum coinciding with the beginning of the first laboratory rotation. The topics will include rules and regulations governing
research with humans, rules and regulations governing animal research, managing competing interests, and data acquisition, management, sharing, and ownership.

The second module (Phase II) will be offered during a one-day course in late summer for those students preparing to enter the graduate phase of their training. The topics presented during this module will include the ethics of peer review, research misconduct, publication practices and responsible authorship, and mentor and trainee responsibilities. The two modules will cover all content areas required by the NIH.

D. Registration during the Graduate Years

Students should be aware of the program of study for their department as outlined in the student’s request to join a department or program. It is the student’s responsibility to contact the DGS or coordinator as soon as the decision to join a program has been approved by the Leadership Team. If no didactic courses are required during the first summer semester, students should register for “0” hours of 8379 (pre-qualifying examination Ph.D. dissertation research).

After completion of the required 72 hours of coursework and after passing the qualifying exam, the student should register for zero hours of 399 (post-qualifying exam Ph.D. dissertation research). This registration ensures maintenance of student status during the time it takes to complete the Ph.D. degree. Directors of Graduate Study or program coordinators can assist with questions about registration and credit hours.

XI. Student Progress

MSTP students are reviewed annually by the MSTP Senior Oversight Committee. This review includes:

A. Appraisal of Medical School and Graduate School Course Grades

1. In the preclinical and clinical Medical School phase, all promotion decisions are made by the appropriate Medical School promotions committee.

2. Students must maintain a B average in Graduate School courses.

3. For Medical School courses that will be used for Graduate School credit, a “P” grade will be recorded on the Graduate School transcript as a “B+,” an “HP” as an “A-,” and an “H” as an “A.”

B. Student Individual Development Plans

Each MSTP student will use a formal system of reporting progress in the form of an Individual Development Plans (IDP). An IDP form tailored specifically for MSTP students was developed by a student committee. All MSTP students are required to submit an IDP describing accomplishments for the previous academic year and plans for the upcoming academic year. The
completed IDP will be submitted to the MSTP Director, MSTP faculty advisor, Ph.D. mentor, and appropriate DGS prior to an annual meeting with the faculty advisor and Ph.D. mentor.

C. Evaluations by Mentors and Thesis Committees

Copies of all correspondence between Ph.D. thesis committees and MSTP students must be provided to Dr. Jim Bills, Assistant Director.

D. Performance on Ph.D. Qualifying Examinations

Results of Ph.D. qualifying examinations should be provided to Dr. Bills.

E. Probation

MSTP students deemed not to be progressing satisfactorily by the Medical School or Graduate School are formally placed on probation for one year. The MSTP Senior Oversight Committee may recommend withholding stipend support for such students during this time. Tutors are provided to students who encounter academic difficulties. Students who are asked to remediate unsatisfactory performance during dual-degree training are also placed on probation with possible suspension of stipend. Continued poor performance will result in dismissal from the program. Dismissed students can apply for readmission to the program and are judged based on demonstrated correction of deficiencies.

F. Attendance

Students who miss more than 20% of the MSTP seminar series meetings or clinical preceptorship sessions in any two semesters will be reviewed by the MSTP Senior Oversight Committee. Failure to resolve problems with attendance at required MSTP activities will result in dismissal from the program.

XII. Advising System

There are many individuals available to MSTP students for advice and counsel. These include members of the MSTP Leadership Team, faculty advisors and student advisors in the MSTP Advising Colleges, departmental directors of graduate study, research mentors, and senior members of the administrative staff.

The MSTP Directors also have formal meetings with each class once or twice yearly to discuss aspects of the training program unique to each year of the MSTP curriculum.

A. MSTP Leadership Team

Terence S. Dermody, M.D.
Dorothy Overall Wells Professor, Pediatrics and Pathology, Microbiology, and Immunology Director, Division of Pediatric Infectious Diseases
Director, Vanderbilt MSTP
B. MSTP Advising Colleges

The Vanderbilt MSTP has been organized into four advising colleges that serve as the primary advising mechanism for students in the program. Each advising college is led by three faculty members, at least two of whom are physician scientists (M.D./Ph.D. or M.D. with research training). The MSTP advising colleges are organized in accordance with the advising system for the School of Medicine. Matriculating MSTP students are assigned to one of the four MSTP advising colleges in addition to a VMS advising college and are expected to attend both MSTP and VMS group activities and career-related seminars during their time in medical school. Specific advising functions for MSTP students will be served by the MSTP advising colleges.

Colleges are composed of 2-3 members of each class across all years of the MSTP. Two students (one M2 and one G1) serve as advising college leaders each year; their primary roles are to schedule programming and facilitate student-advisor interactions. Together, the student leaders make up the College Advisory Board (CAB), which will be chaired by a G1 or G2 student each year. G2 student Yuantee Zhu is the CAB president for the 2014-2015 academic year. Entering MSTP students are assigned to advising colleges in consultation with the CAB and the Associate Dean for Students, Office for Medical Student Affairs.

The faculty advisors’ role is to counsel students in the selection of research rotations and elective courses and assist students in the choice of a mentor and graduate department. The advisor and trainee meet formally at least once each year and more frequently if necessary. Students are asked to submit a brief progress report to the advisor and the MSTP Director prior to the annual advisor meetings. These reports also allow the Leadership Team and the MSTP FAC to monitor the progress of each student. In addition to meeting yearly with each student in their college, the faculty leaders of the colleges will be responsible for directing and leading their MSTP Seminar Series breakout sessions. The Advising Colleges faculty roster is located in Section XXVI.
C. Departmental Directors of Graduate Study

Each graduate department or program participating in the MSTP has a Director of Graduate Study. These individuals provide administrative support for Ph.D. training. The Directors of Graduate Study are available to MSTP students for department-specific guidance during the period of research training and serve as a critical liaison between the departments and the MSTP Leadership Team.

D. Research Mentors

The research mentors play a major role in advising students. These individuals work closely with students and are in an optimum position to assist with a variety of personal and professional issues.

E. Other Advisors

1. Roger Chalkley, D.Phil., Professor of Molecular Physiology and Biophysics, Senior Associate Dean for Education in the Biomedical Sciences

2. Scott M. Rodgers, M.D., Associate Professor of Psychiatry and Medical Education and Administration, Associate Dean for Students

3. Katherine E. Hartmann, M.D., Ph.D., Associate Dean for Clinical and Translational Scientist Development, Deputy Director for the Institute of Medicine and Public Health, Professor of Medicine and Obstetrics and Gynecology, Lucius E. Burch Chair of Reproductive Physiology and Family Planning

XIII. Funding and Stipends

A. Funding for MSTP Students

Students who enter the MSTP prior to the M1 year receive a tuition scholarship for Medical School and Graduate School and an annual stipend to cover living expenses. For these students, the FMK, FCC, and G1 years are funded by the program, the graduate years following G1 are funded by the graduate training laboratory, and the remaining medical year following the return to Medical School are funded by the program. Students who enter the MSTP directly from Medical School receive tuition and stipend support for Medical School and Graduate School years subsequent to the time of entry into the program. For planning purposes, the G1 year that is supported by the MSTP ends on August 31. Therefore, departments will be responsible for tuition, stipend, and other support effective September 1. For students returning to Medical School following completion of the Ph.D., support normally begins on the first day of the month of the beginning of medical training.

MSTP students who return to Medical School prior to January 1 do not need to register in the Graduate School for the fall semester. Regardless of the specific return date, the School of
Medicine enrollment will be effective from July forward. Students who enroll in the graduate school for the fall semester will result in double billing for tuition, insurance, and fees.

Students who enter the MSTP prior to the M1 year are not eligible for support by other institutional NIH training grants during the interval of graduate training. However, MSTP students can apply for individual NIH F30 predoctoral fellowships and non-NIH predoctoral fellowships. Many MSTP students have received funding from such programs to support their graduate studies. MSTP students also may be supported during graduate training by NIH research grants.

MSTP-CIT students will receive a tuition scholarship and stipend to cover expenses for graduate training. Predoctoral MSTP-CIT students also will receive a tuition scholarship and stipend for the Medical School years subsequent to the time of entry into the MSTP. Funding will be provided by the program for the G1 year. Funding for the remaining years will be provided by individual or institutional training grants or grants used to support the mentor’s research. Postdoctoral MSTP-CIT students who enter the program after residency or fellowship also may be supported by the K12 portion of the NIH Clinical and Translational Science Award. The MSTP will not be able to cover the costs of medical training completed prior to entering the conventional MSTP or the MSTP-CIT.

B. Pay

Stipend checks will be issued on the last business day of each month. The first check will be issued on June 30 of the entering year. As stipulated by the NIH, MSTP students are not to engage in private employment.

C. Taxes

Student stipends are subject to Federal income taxes, a policy in place since 1986. It is the student’s responsibility to report, pay, and file taxes. Taxes will not be withheld from stipend checks because students are trainees and not employees. It is illegal for Vanderbilt to report, withhold, or pay taxes for persons in training positions. Likewise, when tax season arrives after the first of the year, Vanderbilt will not issue either a W-2 or a 1099.

By strict Vanderbilt policy, the MSTP Leadership Team is not authorized to give tax advice. However, the Leadership Team may provide the information below:

1. Paying Estimated Tax: To avoid paying a lump sum of taxes when you file your returns in the spring, estimated taxes should be paid ahead of time, normally at quarterly intervals (September and January).


3. For more information about filing estimated taxes or to obtain a Federal “Estimated Tax” form, go to the Internal Revenue Service website at http://www.irs.gov.
D. Extracurricular Work or Activities

The School of Medicine does not regulate the outside work or activities of its students, although it does take the firm position of discouraging outside work. No outside commitments may be assumed by medical students that may compromise their student responsibilities. If the outside obligation creates a conflict of interest, a student may be directed to discontinue it.

Since the NIH is funding each MSTP student, including providing a stipend, 100 percent of each student’s activities should be directed toward fulfilling the responsibilities of full-time M.D. or Ph.D. studies. Any questions related to this issue should be directed to a Leadership Team member.

XIV. Health Insurance and Leave Policies

A. Health Insurance

All Vanderbilt students are required to have health insurance. The MSTP will provide health insurance coverage for all students. This insurance may be waived if the student receives coverage from a spouse or parent, but an insurance waiver must be completed online (www.gallagherkoster.com) each academic year prior to August 1.

Students receiving health insurance through the MSTP should use the Student Health Center as their primary care facility. Referrals to the Vanderbilt Clinic or the Vanderbilt Hospital will be made by Student Health as necessary.

B. Vacations

During the Medical School years from the start of the FMK year through the completion of the spring semester, MSTP students are allowed the same vacations and holidays available to conventional medical students. However, the May-June period in the FMK year is a critical part of MSTP training as that period includes the second mandatory laboratory rotation. Students may have a short vacation, normally the equivalent of a long weekend, either immediately preceding or following the rotation if the schedule allows. Additional vacation time will be coordinated with the MSTP Director.

USMLE Step 1 must be taken by July 1 following completion of the FCC year. Changes to the VUSM calendar may result in small adjustments to the dates. Vacations during the years of graduate training are to be arranged with the laboratory mentor in accordance with the policies of the department chosen for graduate study. As a general guideline, MSTP students should be allowed two weeks of vacation per year (exclusive of Vanderbilt holidays). MSTP students will continue to receive stipends during vacation and holidays.

C. Sick Leave

MSTP students may continue to receive stipends for up to 15 calendar days of sick leave per year. Under exceptional circumstances, this period may be extended in response to a written
request from the student to the NIH awarding office that is countersigned by the MSTP Director. Sick leave may be used for medical conditions related to pregnancy and childbirth pursuant to the Pregnancy Discrimination Act. These policies are consistent with NIH guidelines.

D. Parental Leave

MSTP students are allowed to take 60 calendar days per year of parental leave with full stipend and continued health insurance coverage for the birth or adoption of a child. Either parent is eligible for parental leave. The use of parental leave must be approved by the MSTP Director. Extensions of leave beyond this period should be arranged with the mentor and the MSTP Director. These policies are consistent with NIH guidelines.

E. Leave of Absence

1. Medical Conditions. MSTP students may request a leave of absence from the program in cases of significant medical conditions or personal or family hardships and in accordance with the Family Medical Leave Act. Such requests will be made in writing to the MSTP Director. Stipend support cannot be provided during a leave of absence.

2. Other Reasons. On rare occasions, students may require a leave of absence from the program for other reasons. If considering a leave of absence, the student will contact either the Director or Associate Director to discuss the circumstances and to seek advice and counseling. Specific actions are required by students depending upon the situation and the student’s status as a medical student or graduate student. A formal letter must be submitted to the MSTP Director describing the circumstances and specifying the specific period requested for the leave. All leaves of absence will be approved by the MSTP Senior Oversight Committee. Students on leave of absence will formally request re-entry into full-time status by completing an application to return. This policy is in accordance with NIH guidelines.

3. Postdoctoral Training. If circumstances allow, MSTP students may be appointed to a postdoctoral training position following completion of the Ph.D. and prior to returning to medical school. If a student is considering a postdoctoral position, he/she will notify the MSTP director. Upon confirming the position, the student must request a formal leave of absence that will be coordinated through the medical school registrar. Not doing so may impact the student’s standing and subsequent return to student status upon conclusion of the fellowship.

XV. Travel Support for MSTP Students

A. Overview

The MSTP supports the travel of our students to scientific meetings. These meetings offer an opportunity to present research findings to national or international audiences and attend talks given by outstanding scientists about important research topics. Moreover, they offer a period of intensive scientific interactions that serve to modify current research objectives and plan new ones.
B. Scope

The MSTP provides yearly $500 travel grants to students who will present their Vanderbilt research at national or international scientific meetings. Students are eligible for a travel grant once per academic year up to a total of three awards. Students must have an approved presentation prior to requesting a travel grant. Contact Dr. Bills to request a travel grant with the following information: 1) name of conference, 2) location, 3) inclusive dates of travel, 4) the title of the presentation, and the email from the conference approving the presentation. Without these items, a travel grant will not be approved.

The MSTP also offers all-expenses-paid travel grants to selected students each year to attend the national M.D./Ph.D. student conference hosted by the University of Colorado and the American Physician Scientist Association annual meeting. Selection of the recipients of these grants is made based on scientific quality by the MSTP Leadership Team. Opportunities to attend other conferences will be made available to eligible students.

The Graduate School offers students $500 grants annually for travel to attend meetings within the continental US and $1000 biennially to attend international meetings. The Graduate School has more information. The Vanderbilt School of Medicine also offers travel funds for students in the medical phase of training. The Office of Medical Student Research website (https://medschool.vanderbilt.edu/student-research/) contains additional information about travel funding.

C. Travel Policies

The award of an MSTP travel grant carries the responsibility of complying with Vanderbilt travel policies for students. We provide below a few general guidelines below about travel. Complete information may be found at https://medschool.vanderbilt.edu/student-research/student-travel or by consulting with Dr. Bills, Ms. Krasnove or, if in graduate research, the departmental administrator.

For Students Not in Concur. Prior to travel, complete a student travel request form. Send it to the departmental administrator (if in Graduate School) or Ms. Krasnove. Students must have an approved presentation prior to being awarded a travel grant, documented by an email from the conference approving the talk or poster. Signing a student travel form upon returning from travel indicates that all expenses for which the student is seeking reimbursement are in accordance with Vanderbilt travel guidelines.

For Students in Concur. For students who are registered in Concur, procedures are still being developed for the processing of travel funds, including guidelines for travel advances, expenses, and reimbursements. Consult with the departmental administrator for specific guidance.

Booking travel. Students are asked to purchase the least expensive airfare possible. Delaying the booking of a flight until such time that Vanderbilt will incur an increased cost may result in reimbursement at a rate for less expensive airfare. For example, if a student is approved for travel two months prior to a meeting, yet waits until a few days before the meeting to make an airline reservation, reimbursement will be provided for the cheaper flight.
**Meal Expenses.** Expenses for meals are reimbursable on the basis of actual, reasonable expenses incurred. Only meals during travel will be reimbursed. An itemized receipt of each meal must be provided to be reimbursed. Non-itemized meals will not be reimbursed. Students will not be reimbursed for meals consumed during the period of time when the conference includes a meal paid for as part of the registration fee. For example, if the registration fee includes a dinner meal and the student elects to eat elsewhere, the student will not be reimbursed.

- **Alcoholic Beverages.** Alcoholic beverage costs generally are considered personal expenses and will not be reimbursed.

**XVI. Awards, Fellowships, and Other Extramural Funding**

A. **The Canby Robinson Society Scholarships**

The Canby Robinson Society (CRS) supports the entire School of Medicine tuition for selected Medical and MSTP students each year. CRS scholarships are used to recruit competitive applicants to the Vanderbilt University School of Medicine. Nominations are made prior to matriculation based upon academic and research accomplishments and leadership potential. A subcommittee of the CRS selects the scholarship students.

B. **The Shayne Scholarship**

The Shayne Scholarship is awarded annually to the MSTP student with the most outstanding Ph.D. training accomplishments. Trainees are selected by the MSTP Leadership Team and the Dean of the School of Medicine based on research productivity (research papers and review articles), presentations at national and international meetings, and investigative leadership. Special consideration is given to students who have made interdisciplinary discoveries that bridge previously unrelated fields. Shayne Scholars receive stipend support from the Herbert M. Shayne Endowment for the Medical School years following Ph.D. training. Support from the Shayne Endowment allows us to support two Shayne Scholars concurrently.

C. **The Merz Scholarship**

Information to be provided.

D. **Other Fellowships**

The American Physician Scientists Association website contains a list of potential predoctoral, postdoctoral, and early career level funding opportunities. Such sources include several from the NIH, Department of Defense, and private sources. For more information, access the site at http://www.physicianscientists.org.

E. **Other Extramural Funding Sources**

Two categories of possible funding sources for M.D./Ph.D. students are private, non-federal sources and federal sources. Students are encouraged to check with the MSTP Leadership Team
to ensure that funding policies are followed and to apply for funding appropriate to the scientific discipline. For a comprehensive list of funding sources, including funding sources for non-US citizens or non-permanent residents, visit the MSTP website at https://medschool.mc.vanderbilt.edu/mstp/current_students and click on “Funding Sources.”

XVII. Reentry into Medical School from Graduate School

A. The Thesis Defense

The MSTP requires students to defend both the oral and written components of the Ph.D. thesis before returning to Medical School. Successful defense of the thesis is demonstrated by a signed Graduate School Dissertation Defense form and signatures on the title page of the dissertation. There can be revisions made to the thesis after the defense, but these revisions must be of the type that the committee does not consider required for successful defense of the thesis (i.e., minor text revisions).

B. Notification of Intent to Reenter Medical School

Students should notify the Medical School registrar of the intent to return to clinical training. The registrar will contact all senior MSTP students in January of the year being planned for the return. Students must contact the registrar in order to begin the process of coordinating re-entry and, for returning students, requesting clerkship slots.

All MSTP students scheduling reentry into clinical training must submit written documentation to the MSTP Director from the mentor indicating that the student’s thesis committee has approved defense of the thesis in a time frame to allow the student to reenter Medical School on the date requested. All students will be provided the reentry form by Dr. Bills. This form is signed by both the student and mentor and forwarded for signature to the MSTP Director and Associate Dean for Medical Student Affairs.

C. Reentry Procedures

MSTP students who matriculated prior to 2013 will reenter medical training in the Foundations of Clinical Care (FCC) year followed by a single Immersion year. When transitioning from the graduate phase of training to medical school, students may reenter at any point coinciding with the beginning of a clerkship in Blocks 1 and 2. Students planning reentry after the beginning of FCC year Block 1 must have permission from the MSTP Director and Associate Dean for Medical Student Affairs as documented on the form entitled “Intent to Reenter Vanderbilt University School of Medicine Following Award of the PhD Degree.”

1. Deferring Clerkships and Minimum Immersion Credits. MSTP students who reenter medical training after the beginning of FCC-year Block 1 may defer completion of FCC clerkships until the Immersion year, when they will complete FCC-year requirements and Immersion-year requirements and electives. MSTP students may defer up to two blocks to the Immersion year with the approval of the MSTP Director and the Associate Dean for Medical Student Affairs. These students will participate in the Diagnosis and Therapeutics introductory
“bootcamp” even if still enrolled in graduate training. Deferral of clerkship blocks does not relieve students from participating in any D&T activities and other curricular responsibilities.

2. MSTP students reentering after Block 2 will, at a minimum, complete six months of Immersion-year clinical activities. Students must complete all required clinical experiences; the remaining months will consist of other elective courses. The requisite research blocks will be credited to each student by Enrollment Services.

3. Students may request the use of the Clinical Preceptorship Program (CPP) as a single Immersion elective block. The use of the CPP for elective credit will be available on relatively rare occasions for those students who reenter the FCC year at the end of Block 2 or at the beginning of Block 3. The additional credit will be approved only with the permission of the MSTP Director and the Associate Dean for Medical Student Affairs and must be reflected on the student’s graduate transcript. Students must have completed 160 CPP course hours to be awarded credit. Students who participated in the MSTP clinical immersion course must show documentation of at least 160 clinically-related hours.

4. VUSM Block 3 Reentry. Students requesting reentry at the beginning of Block 3 will be counseled by the MSTP Director and the Associate Dean for Medical Student Affairs about the potential pitfalls of this schedule. Each student must have a clear plan for completing the remaining Immersion-year requirements. Any delay in completing curriculum requirements, whether for academic or personal reasons, will leave the student with insufficient time to take USMLE Step 2, match in a competitive residency, and graduate the following spring. This situation may be exacerbated in cases in which the residency director at an institution to which the student is applying only ranks applicants with a USMLE Step 2 score.

D. Required Meetings

Once the Medical School has been notified of the intent to reenter, MSTP students should be added to the medical student mailing list. The registrar will inform rising students about required meetings held during the spring of the final year in Graduate School.

E. Helpful Advice

It is useful for MSTP students re-entering Medical School to have their names added to the class e-mail list (for the class that will be joined) in early January of their final graduate year. This can be accomplished by emailing the Medical School registrar. Inclusion on the class e-mail list will ensure that any official announcements are received and provide an opportunity for MSTP students to become involved in some class activities. Returning students should obtain a copy of The Oar from the Medical School’s Office of Student Events.

Class elections are usually held in early April and conducted by one of the current class officers. MSTP students interested in running for a position or serving on a committee (or just simply voting for class representatives) should find out who is in charge and let him or her know of their interest. MSTP students should obtain a password to access information on the web about the class that will be joined.
XVIII. MSTP Seminar Series

A. Overview

The MSTP Seminar Series is an interdisciplinary seminar course in a journal-club format designed to foster critical-thinking skills and scientific creativity through oral presentations of primary literature. It is the flagship course of our educational program. The Seminar Series was retooled in 2013 in response to a significant curriculum revision in the School of Medicine by incorporating a clinical, case-based component to take advantage of the curricular changes. The seminar series is interdisciplinary in scope, with topics drawn from all areas of biomedicine. MSTP students choose the manuscripts to be presented with the advice and consent of their student and faculty advisors. Junior medical and graduate students usually present in small group sessions, while other students will present in the large group setting. Senior graduate-phase students are assigned mentoring responsibilities to assist the junior students with presentations.

B. Design

The course is required for all FMK year and G-phase students. To maintain NIH support for our program, we must ensure that all FMK and G-phase students attend the MSTP seminar series. The MSTP Seminar Series will count toward elective requirements in the Medical School. Several graduate departments allow transfer credit of the seminar series to graduate transcripts and count the series as elective credit in their departmental programs. Refer to the section entitled “Grades” below.

C. Objectives

The objectives of the MSTP Seminar Series are to: (i) foster development of critical-thinking skills by appraisal of contemporary scientific literature, (ii) enhance scientific creativity through discussion of experimental approaches and techniques, and (iii) develop oral presentation skills.

D. The Mentor-Presenter Relationship and Expectations

Students are assisted in the preparation of their presentations by senior G-phase students serving as mentors. Student mentors will help with paper selection, presentation organization, and review of visual aids. Student mentors are asked to provide feedback to the presenter after the talk.

The presenter will be expected to discuss their paper choice with their student mentor at least six weeks prior to their presentation date. The mentor will give feedback and suggestions and is responsible for approving the paper chosen. Once approved, the mentor will forward the paper choice to the designated faculty facilitator at least one month prior to the presentation date for final approval. This process will ensure that the presenter and mentor start discussing the presentation early and that the mentor has a stake in ensuring that the paper is of high quality.

The mentor will ensure that a meeting is scheduled at least one week in advance for a practice presentation. The mentor will introduce the speaker at the seminar and serve as a facilitator to aid in the question-and-answer portion of the seminar and even asking questions to spur discussion.
The presenter and mentor will be expected to bring any concerns to the attention of the faculty preceptor.

E. Manuscript Choice

FMK-year students will select papers in close consultation with their mentor. G-phase students should select a seminal or foundational manuscript directly relevant to their thesis project or a paper describing a technique or procedure that will be used in the dissertation research. Presenters should obtain approval from the student mentor and faculty preceptor for each paper chosen. **No papers with authors from Vanderbilt can be presented.**

Please email to Melissa Krasnove a link to the article that you will be presenting as soon as the final decision is made. Melissa will post the article on the MSTP calendar and email it to all students and faculty in order for students to read the paper beforehand and be prepared with one or two questions for the presenter.

F. Presentations

Students are asked to prepare a thirty-minute presentation describing the paper chosen for discussion. All presenters will utilize a journal club-style presentation format with PowerPoint slides in an effort to have a consistent presentation model for all students. This approach will be used for both large and small groups.

The presentation should begin with a discussion of appropriate background information, relevant methods, a description of key findings of the study, and conclude with a discussion of next steps. Questions are encouraged throughout the presentation. The faculty preceptors and student mentors serve to facilitate discussion and encourage questions from the audience. Students will be assigned specific presentation dates. Every effort will be made to schedule presentations outside of exam periods, but this is sometimes not possible. Students are expected to plan well enough in advance to have their presentation prepared even if it takes place within the week of an exam.

In the event that a student is unable to give a presentation on the assigned date, the student mentor and faculty preceptor should be contacted as far in advance as possible. Students are responsible for coordinating a replacement with a student from their group.

G. Feedback

The audience will complete feedback forms that will then be provided to the presenter as either a statistical/thematic analysis or copies of the forms. Student mentors should also provide direct feedback to presenters. Presenters are encouraged to contact their faculty preceptor if wishing to discuss specifics of the presentation or any aspect of the audience evaluations.

H. Grades

All M1 students and G-phase students whose departments accept graduate credit for the seminar will receive a grade. Grades will be based on: (i) the quality of the presentations, (ii) participation in group discussions, and (iii) attendance. **Students must attend 80% of the**
sessions to receive a passing grade. Attendance is determined exclusively from the sign-in sheet. For each semester, the course will fulfill requirements for ONE elective in the medical school curriculum and provide ONE didactic credit hour for the graduate school.

I. Attendance

A sign-in sheet is used to document attendance of all MSTP students each week, which will constitute a substantial portion of the grade for FMK and G-phase students. Senior G-phase students who achieve less than satisfactory attendance will be subject to review by the MSTP Senior Oversight Committee. Students unable to attend a seminar must email Ms. Krasnove beforehand to receive an excused absence.

XIX. MSTP Clinical Preceptorship Program

A. Overview

The MSTP Clinical Preceptorship Program (CPP) provides graduate-phase MSTP students with exposure to clinical medicine during the period of research training. The objectives of this portion of the MSTP curriculum are to provide exposure to clinical medicine during the graduate phase of training, to retain clinical competencies attained during the first two medical years, and to facilitate the transition back to Medical School following completion of the Ph.D. This learner-centered program allows students to continue their Medical School continuity clinical experience or to nominate one or more clinical preceptors to serve as their mentor.

B. Course Objectives

The objectives of the CPP are to: (i) provide exposure to clinical medicine for MSTP students during research training, (ii) retain clinical competencies attained during the first two medical years, and (iii) facilitate the transition back to Medical School following completion of the Ph.D.

C. Leadership

Sally York, M.D., Ph.D., Assistant Professor of Medicine, Associate Director, Vanderbilt MSTP

D. Organization

For students entering the MSTP prior to 2013, each class is assigned two clinical mentors, an internist and a pediatrician, who work with the class for the duration of their graduate training. One-half of the class works with the internist in the fall semester, and the other works with the pediatrician. The classes switch mentors for the spring semester. Students meet with mentors monthly during the academic year (September to April) to discuss one or two patients who have been evaluated by one of the students before the group session.

For students who matriculated in AY 2013 and 2014, the continuity clinical experiences can be continued or one or more clinical preceptors in other medical specialties can be nominated as their clinical mentor during graduate research training. Specific procedures for identifying mentors, developing individual clinical plans, and tracking clinical events will be provided. The
developing and tracking of clinical events is important, as approximately 160 hours should be logged over the course of graduate training. This documented level of activity is necessary should the student need to substitute CPP participation for one month of immersion credit.

E. Participation

The success of the CPP is entirely dependent on student participation. Learning objectives will only be achieved with the participation of each student. Therefore, attendance is required for the preceptorship sessions. If students are unable to attend a scheduled clinical event, they are asked to inform the clinical mentor in advance. Failing to do so is a direct reflection on the student’s professional conduct.

F. Feedback

Students are provided with feedback by the clinical mentors following each semester of the CPP. Mentors offer guidance about attributes of the clinical encounter that are performed effectively and suggest opportunities for improvement. No formal grades will be given for the CPP.

XX. MSTP Physician-Scientist Speaker Series

The Physician-Scientist Speaker Series was initiated by MSTP students to enhance their career development through interactions with renowned physician-scientists who had successful academic careers. The series is organized by a committee of student volunteers led by G1 student Michael Litt that invites two speakers each year after gathering suggestions from other students in the program, faculty members, and research mentors. Since there are a number of outstanding physician-scientists at Vanderbilt, one speaker is selected from the Vanderbilt faculty while the other is invited to Nashville from elsewhere. The goal of the committee is to invite scientific leaders who have trained as an M.D. or M.D./Ph.D. and often serve as a division chief, department chair, or dean.

Following the invitation, the committee is responsible for planning the speaker’s visit to Vanderbilt. Throughout the day, the speaker will meet with small groups of students working in a related field, as well as any faculty members who share a common research interest. The two main events of the speaker series are a research seminar and a dinner with the MSTP students. At the dinner, the speaker is asked to discuss his or her training, professional development, important career decisions, secrets to success as a physician-scientist, and perspective on the role of physician-scientists in medical research. After several of these conversations, students in the program should have an enhanced understanding of the many different paths that lead to successful physician-scientist careers.

XXI. MSTP Retreat

The annual MSTP retreat provides a unique opportunity for interactions among students, faculty, and staff in the MSTP. The focus of the MSTP retreat is cutting-edge science. Presentations are made by all students in the graduate phase of training. Keynote addresses are given by MSTP alumni and members of the Vanderbilt faculty. The retreat, normally held in late June, also
serves as an introduction to research at Vanderbilt for new students who have been accepted into the MSTP. The event also is attended by the MSTP FAC, advising college leaders, departmental chairs, departmental directors of graduate study, and faculty preceptors.

A. Attendance

All MSTP students are required to attend the MSTP retreat. Absences must be approved by the MSTP Director.

B. Research Presentations

All students in the graduate phase of training are required to present their research at the retreat. Senior graduate students who plan to soon re-enter medical studies following completion of graduate training are asked to give an oral presentation. All other students engaged in graduate study, including rising G1 students, present their research either at a poster session or a chalk talk.

C. Abstracts

All students in the graduate phase of training are required to submit half-page abstracts describing their research. Abstracts must be submitted to Ms. Krasnove no later than one month prior to the retreat.

XXII. MSTP Leadership Workshop

The biennial Vanderbilt MSTP Leadership Workshop provides formal training in leadership for MSTP students. The main objectives of the MSTP Leadership Workshop are to provide students with an opportunity to assess individual leadership styles, discuss cases in research and clinical leadership, and receive didactic instruction in core leadership competencies. Some of the competencies featured in the workshop include motivation, strategic planning, recruitment, retention, negotiation, and conflict resolution. Most of the content is delivered through discussion of leadership cases, various activities, and accompanying didactic presentations.

The MSTP Leadership Workshop is held in the fall of even-numbered years. Students enrolled in the G1 and G2 years are required to attend. A committee of students is responsible for organizing the leadership workshop.

XXIII. MSTP Career Development Workshop

The biennial Vanderbilt MSTP Career Development Workshop provides formal exposure to the variety of career paths chosen by physician scientists. The main focus of the workshop is on the timeframe from MSTP graduation to the completion of clinical and research training. Guest speakers from inside and outside of Vanderbilt are invited to participate. Panel discussions focus on the transition to independence and work-family balance.
The MSTP Career Development Workshop is held in the fall of odd-numbered years. Students enrolled in the last two years of Ph.D. training and the senior Medical School year are strongly encouraged to attend. A committee of students is responsible for organizing the career development workshop.

XXIV. MSTP Data Club

The MSTP Data Club provides a forum for MSTP students to discuss current research projects with their colleagues. The Data Club convenes weekly during the summer semester. Each meeting features a graduate-phase student presenting his or her laboratory work in an informal setting designed to encourage discussion and feedback.

The format of the Data Club is that the student presenter provides a 30-minute presentation describing elements of their research, the lab environment, and their overarching research and career goals with an emphasis on the “big picture.” Future directions of the research and clinical implications of the research are critical components of the presentation.

XXV. Wellness Resources

- Associate Dean Scott Rodgers, Office of Medical Student Affairs
  Office: 322-6109

- Assistant Dean Kathy Pettepher, Office of Medical Student Affairs
  Office: 343-3427

- Associate Vice-Chancellor for Health Affairs, Senior Associate Dean for Health Sciences Education
  Office: 343-7536

- Dr. Mistie Germek, BRET Office
  Office: 343-4611

- RESPOND – 24 hours (Psychiatric admitting department)
  327-7000

- Student Health Center, Zerfoss Building
  322-2427

- Vanderbilt University Psychological and Counseling Center, Baker Building, 11th floor
  322-2571

- Vanderbilt Institute for Treatment of Addiction (VITA) – 24 hours
  327-7200

- Margaret Cuninggim Women’s Center, Franklin House, West Side Row
  322-4843
XXVI. Meharry-Vanderbilt Alliance

A. Meharry Medical College.

Meharry Medical College is a private, historically black academic medical center. Since its founding in 1876, it has been the leading producer of African-American physicians and dentists, and today is one of the nation’s leading producers of African-American Ph.D.s in the biomedical sciences. The College is particularly known for its emphasis on the primary health care needs of minorities, the poor, and the disadvantaged.

B. Vanderbilt-Meharry Alliance.

In 1999, Vanderbilt University Medical Center and Meharry Medical College established an alliance to enhance the educational, scientific, and clinical programs at and between both institutions. The Vanderbilt-Meharry Alliance establishes a formal relationship that brings together the two institutions in collaborative efforts for undergraduate and graduate medical education, research and training, use of shared research, teaching, patient care, and library facilities, and enhanced interactions of students and faculty at the two schools. The Alliance agreement specifically ensures that both entities will remain independent with their unique missions intact. The Alliance is intended to help both institutions achieve a higher level of excellence through complementary management and use of programs and resources. An Alliance Steering Committee provides implementation and oversight. This committee has an equal number of representatives from each institution and includes deans of both medical schools.

C. Vanderbilt-Meharry Programming for MD/PhD students.

The Vanderbilt MSTP offers an opportunity for students enrolled in the M.D./Ph.D. program at Meharry to fully participate in programs developed for dual-degree students at Vanderbilt. The biennial Leadership Workshop and Career Development Workshop are led by student committees, both of which include M.D./Ph.D. students from Vanderbilt and Meharry. Planning these workshops incorporates the needs, interests, and scheduling for students at both institutions to foster maximum student participation and interaction.
XXVII. Contacts

A. MSTP Leadership Team

Terence S. Dermody, M.D.
Dorothy Overall Wells Professor of Pediatrics and Pathology, Microbiology, and Immunology
Director, Division of Pediatric Infectious Diseases
Director, Vanderbilt MSTP
D-6227 Medical Center North

Danny G. Winder, Ph.D.
Professor, Molecular Physiology and Biophysics, Psychiatry
Director, Vanderbilt Murine Behavioral Core
Associate Director, Vanderbilt MSTP
750A Robinson Research Building

Sally J. York, M.D., Ph.D.
Assistant Professor, Medicine
Associate Director, Vanderbilt MSTP
688 Preston Research Building

James L. Bills, Ed.D., M.S.
Assistant Professor, Medical Education and Administration
Assistant Director, Vanderbilt MSTP
D7227 MCN

Michelle M. Grundy, Ph.D.
Assistant Professor, Medical Education and Administration
Assistant Director, Vanderbilt MSTP
340 Light Hall

Melissa Krasnove, M.Ed.
MSTP Program Coordinator
340 Light Hall

B. MSTP Advising College Leaders

Avery-Cohen College

David M. Aronoff, M.D.
Associate Professor of Clinical Medicine
Director, Division of Infectious Diseases
A2200 MCN

Amy S. Major, Ph.D.
Assistant Professor, Medicine, Pathology, Microbiology, and Immunology
352 PRB

Ambra Pozzi, Ph.D.
Professor, Medicine, Cancer Biology  
B3109 Medical Center North  

Goodpasture College  

Bruce D. Carter, Ph.D.  
Professor, Biochemistry  
625 Light Hall  

Mia Levy, M.D., Ph.D.  
Assistant Professor, Biomedical Informatics  
691 PRB  

Daniel Moore, M.D., Ph.D.  
Assistant Professor, Pediatrics, Pathology, Microbiology, and Immunology  
11136 DOT  

Stahlman-Thomas College  

Maureen A. Gannon, Ph.D.  
Associate Professor, Medicine, Molecular Physiology and Biophysics, Cell and Developmental Biology  
7435 MRB IV  

Luc Van Kaer, Ph.D.  
Professor, Pathology, Microbiology, and Immunology  
811 Light Hall  

Christopher S. Williams, M.D., Ph.D.  
Assistant Professor, Medicine, Cancer Biology  
1030 MRB IV  

Sutherland College  

Dan M. Roden, M.D., C.M.  
Professor, Medicine, Pharmacology  
532C Robinson Research Building  

John M. Stafford, M.D., Ph.D.  
Assistant Professor, Medicine, Molecular Physiology and Biophysics  
7445 MRB IV  

Pampee P. Young, M.D., Ph.D.  
Associate Professor, Medicine, Pathology, Microbiology, and Immunology  
C2217 Medical Center North
C. MSTP Senior Oversight Committee

The MSTP Senior Oversight Committee provides guidance about all aspects of the program. This committee meets once or twice each year and is particularly focused on strategic planning and program oversight. The committee includes Dr. Roger Chalkley, Senior Associate Dean for Education in the Biomedical Sciences, Dr. Bonnie Miller, Senior Associate Dean for Health Sciences Education, Dr. Kim Lomis, Associate Dean for Undergraduate Medical Education, Dr. David Robertson, former MSTP Director, and Dr. Scott Rodgers, Associate Dean for Medical Student Affairs, in addition to the MSTP Leadership Team comprised of Drs. Bills, Dermody, Grundy, Winder, York, and Ms. Krasnove.

D. MSTP Faculty Advisory Committee

The MSTP Faculty Advisory Committee (FAC) is appointed annually by the Dean to assist in the admissions process and provide program oversight and strategic planning. Each applicant for the MSTP is interviewed individually by several members of the FAC, which serves as the School of Medicine Admissions Committee for the MSTP. In addition, each MSTP student has a FAC member assigned as an advisor. In addition to the MSTP Leadership Team, the FAC includes several institutional leaders and senior scientists with responsibility for M.D. and Ph.D. training.

The FAC roster for the 2014-2015 academic year is as follows:

1. Faculty members

R. Daniel Beauchamp, M.D.
J.C. Foshee Distinguished Professor and Chair, Surgery, Cancer Biology, Cell and Developmental Biology
D4316 MCN

Bruce Carter, Ph.D.
Professor, Biochemistry
625 Light Hall

Kevin C. Ess, M.D., Ph.D.
Associate Professor, Neurology, Pediatrics, Cell and Developmental Biology, Biological Sciences
6158C MRB III

Cynthia S. Gadd, Ph.D., M.B.A.
Professor, Biomedical Informatics
444 Eskind Biomedical Library

James R. Goldenring, M.D., Ph.D.
Paul W. Sanger Professor, Surgery, Cell and Developmental Biology
Vice-Chair for Research
Professor, Surgery, Cell and Developmental Biology
10435G MRB IV
Katherine Hartmann, M.D., Ph.D.
Lucius E. Burch Professor, Reproductive Physiology and Family Planning
Professor, Obstetrics and Gynecology and Medicine
Associate Dean, Clinical and Translational Scientist Development
2525 West End Avenue, Suite 600

Charles C. Hong, M.D., Ph.D.
Associate Professor of Pharmacology, Cell and Development Biology
1155A Light Hall

E. Duco Jansen, Ph.D.
Professor, Biomedical Engineering
Associate Dean, Engineering
5805 Science and Engineering Building

Pierre P. Massion, M.D.
Professor, Medicine, Cancer Biology
640 PRB

Andrea Page-McCaw
Associate Professor, Cell and Developmental Biology
4120 MRB III

Kevin G. Niswender, M.D., Ph.D.
Assistant Professor, Medicine, Molecular Physiology and Biophysics
7435 MRB IV

Dan M. Roden, M.D., C.M.
Professor, Medicine, Pharmacology
Wellington Pham

E. Michelle Southard-Smith, Ph.D.
Associate Professor, Medicine, Cell and Developmental Biology
1175 Light Hall

Mark Wallace, Ph.D.
Professor, Hearing and Speech Sciences
Director, Vanderbilt Brain Institute
VBI, MRB III

Roy Zent, M.D., Ph.D.
Professor, Medicine, Cancer Biology, Cell and Developmental Biology
C3210 Medical Center North

2. Student Members

Blair Stocks, G2
Graduate Student, Pathology, Microbiology, and Immunology

2 MSTP Students TBD

3. Ex Officio

Roger Chalkley, D.Phil.
Senior Associate Dean for Education in the Biomedical Sciences
Professor, Molecular Physiology and Biophysics
340 Light Hall

Andre L. Churchwell, M.D.
Associate Dean for Diversity
Associate Professor of Medicine, Radiology and Radiological Sciences, and Biomedical Engineering
319 Light Hall

Kimberly D. Lomis, M.D.
Associate Dean for Undergraduate Medical Education
Associate Professor, Surgery, Medical Education and Administration
201 Light Hall

Bonnie M. Miller, M.D.
Associate Vice-Chancellor for Health Affairs
Senior Associate Dean for Health Sciences Education
201 Light Hall

Scott M. Rodgers, M.D.
Associate Dean for Medical Student Affairs
Associate Professor, Psychiatry
201 Light Hall

E. MSTP Student Advisory Committee

The MSTP Student Advisory Committee (SAC) is appointed annually by the students to provide advice to the MSTP Leadership Team about all aspects of program administration and curriculum. One-to-two students from each entering class serve two-year terms on the SAC. The SAC has been instrumental in MSTP student recruitment and development of several new curricular enhancements for the MSTP. The SAC meets monthly with the leadership team.

The SAC roster for the 2014-2015 academic year is as follows:

Hernan Gonzales                                      Jack Walker
Medical Year 1                                      Medical Year 1
 Petria-George Thompson                             Gabriela DiCarlo
Medical Year 1                                      Medical Year 2
F. Directors/Chairs of Ph.D. Degree-Granting Departments and Programs

Biochemistry
John York, Ph.D.
Professor and Chair, Biochemistry
607 Light Hall

**Biomedical Informatics**
Kevin Johnson, M.D., Ph.D.
Professor and Chair, Biomedical Informatics
416 Eskind Biomedical Library

**Cancer Biology**
Harold L. Moses, Ph.D.
Professor and Interim Chair, Cancer Biology
691 PRB

**Cell and Developmental Biology**
Ian G. Macara, Ph.D.
Professor and Chair, Cell and Developmental Biology
U-3209 MRB III

**Molecular Physiology and Biophysics**
Roger Cone, Ph.D.
Professor and Chair, Molecular Physiology and Biophysics
702 Light Hall

**Pathology, Microbiology, and Immunology**
Samuel A. Santoro, M.D., Ph.D.
Professor and Chair, Pathology, Microbiology, and Immunology
Professor, Biochemistry
C-3322 MCN

**Pharmacology**
Joey Barnett, Ph.D.
Professor and Chair (Acting), Pharmacology
460B PRB

**Department of Biological Sciences**
College of Arts and Science
Douglas McMahon, Ph.D.
Professor and Chair, Biological Sciences
8270A MRB III

**Department of Biomedical Engineering**
Todd D. Giorgio, Ph.D.
Professor and Chair, Biomedical Engineering, Professor, Chemical and Biomolecular Engineering
5921 Stevenson Center

**Chemical and Physical Biology Program**
Hassane Mchaourab, Ph.D.
Professor, Molecular Physiology and Biophysics, Chemistry
741 Light Hall

**Program in Epidemiology**  
Wei Zheng, M.D., Ph.D., M.P.H.  
Director, Vanderbilt Epidemiology Center  
Director, Molecular Epidemiology and Co-Leader of the Cancer Epidemiology and Prevention Program, Vanderbilt-Ingram Cancer Center  
2525 West End – Suite 800

**Program in Human Genetics**  
Roger Cone, Ph.D. (Interim Director)  
Professor and Chair, Molecular Physiology and Biophysics  
702 Light Hall

**Program in Neuroscience**  
Mark T. Wallace, Ph.D.  
Director, Vanderbilt Brain Institute, Professor, Hearing and Speech Sciences, Psychiatry, Psychology  
Vanderbilt Brain Institute, MRB III

G. Directors of Graduate Study

**Biochemistry**  
Chuck Sanders, Ph.D.  
Professor, Biochemistry, Cancer Biology  
5110C MRB III

**Biomedical Informatics**  
Cynthia S. Gadd, Ph.D., M.B.A.  
Professor, Biomedical Informatics  
444 Eskind Biomedical Library

**Cancer Biology**  
Jin Chen, M.D., Ph.D.  
Professor, Cancer Biology, Medicine, Cell and Developmental Biology  
T3207E MCN

**Cell and Developmental Biology**  
Matt Tyska, Ph.D.  
Associate Professor, Cell and Developmental Biology  
3150A MRB III

**Chemical and Physical Biology Program**  
Bruce M. Damon, Ph.D.  
Associate Professor, Radiology and Radiological Services, Molecular Physiology and Biophysics, Biomedical Engineering  
AA3105 MCN
Molecular Physiology and Biophysics
Alyssa Hasty, Ph.D.
Associate Professor, Molecular Physiology and Biophysics
813 Light Hall

Pathology, Microbiology, and Immunology
Program in Cellular and Molecular Pathology
Jay Jerome, Ph.D.
Associate Professor, Pathology, Microbiology, and Immunology,
U2206 MCN

Pathology, Microbiology, and Immunology
Program in Microbiology and Immunology
Christopher Aiken, Ph.D.
Professor, Pathology, Microbiology, and Immunology
AA-5203A MCN

Pharmacology
Christine Konradi, Ph.D.
Professor, Pharmacology
8160 MRB III

Department of Biological Sciences
College of Arts and Science
Katherine L. Friedman, Ph.D.
Associate Professor, Biological Sciences
3150A MRB III

Department of Biomedical Engineering
School of Engineering
Mark D. Does, Ph.D.
Professor, Biomedical Engineering, Radiology and Radiological Sciences
AAA3125 MCN

Program in Epidemiology
Katherine E. Hartmann, M.D., Ph.D.
Professor, Medicine, Obstetrics and Gynecology, Chair, Reproductive Physiology and Family Planning, Associate Dean for Clinical and Translational Scientist Development
2525 West End Avenue

Program in Human Genetics
David Samuels, Ph.D.
Associate Professor, Molecular Physiology and Biophysics; Pediatrics
507B Light Hall

Program in Neuroscience
Bruce Carter, Ph.D.
Professor, Biochemistry
625 Light Hall
XXVIII. Current Students (AY 2014-2015)

Kristie Aamodt
Graduate Year 4
Alvin Powers, M.D.
Molecular Physiology and Biophysics

Chike Abana
Graduate Year 1
Simon Mallal, M.D., Ph.D.
Pathology, Microbiology, and Immunology

Eric Armour
Medical Year 4
Kevin Ess, M.D., Ph.D.
Cell and Developmental Biology

Laura Armstrong
Graduate Year 3
Kevin Ess, M.D., Ph.D.
Cell and Developmental Biology

Ravi Atreya
Graduate Year 4
Mia Levy, M.D., Ph.D.
Biomedical Informatics

Daniel Balikov
Graduate Year 2
Hak-Joon Sung, Ph.D.
Biomedical Engineering

Shawn Barton
Medical Year 2

J. Scott Beeler
Graduate Year 3
Jennifer Pietenpol, Ph.D.
Biochemistry

Jeff Bennett
Medical Year 4
Dan Roden, M.D.

Human Genetics
Camilo Bermudez
Medical Year 1

Kevin Bersell
Graduate Year 2
Alfred George, M.D.
Pharmacology

Nathan Bloodworth
Graduate Year 2
David Merryman, Ph.D.
Biomedical Engineering

Richard Boyer
Graduate Year 3
Wesley Thayer, M.D., Ph.D.
Biomedical Engineering

Michael Burns
Medical Year 3
Steven Fesik, Ph.D.
Biochemistry

Courtney Campbell
Medical Year 4
Al George, M.D.
Pharmacology

Frances Cheng
Medical Year 4
Chin Chiang, Ph.D.
Cell and Developmental Biology

Jacqueline Clauss
Medical Year 3
Jennifer Blackford, Ph.D.
Neuroscience

Laura D’Aoust
Medical Year 3
Jonathan Haines, Ph.D.
Human Genetics

Matthew De Niear
Graduate Year 2
Mark Wallace, Ph.D.
Neuroscience

Benjamin Dean
Medical Year 3
Joshua Gamse, Ph.D.
Neuroscience

Gabriella DiCarlo
Medical Year 2

Elizabeth Dong Nguyen
Medical Year 4
Jens Meiler, Ph.D.
Chemical and Physical Biology

Stephanie Dudzinski
Medical Year 2

Kristen Eckstrand
Medical Year 4
Malcolm Avison, Ph.D.
Neuroscience

John Erickson
Medical Year 4
John Williams, M.D.
Pathology, Microbiology, and Immunology

Ben Fensterheim
Graduate Year 1
Robert Sherwood, M.D., Ph.D.
Pathology, Microbiology, and Immunology

Stephanie Flavin
Medical Year 3
Danny Winder, Ph.D.
Neuroscience
Caleb Ford  
Medical Year 1

Aliya Frederick  
Medical Year 4

Gregg Stanwood, Ph.D.
Neuroscience

Megan Culler Freeman  
Medical Year 3

Mark Denison, M.D.
Pathology, Microbiology, and Immunology

Tanner Freeman  
Medical Year 3

R. Daniel Beauchamp, M.D.
Cell and Developmental Biology

Jean-Nicolas Gallant  
Graduate Year 1

Christine Lovly, M.D., Ph.D.
Cancer Biology

Hernan Gonzales  
Medical Year 1

Kevin Graepel  
Medical Year 2

Brian Grieb  
Medical Year 3

Christine Eischen, Ph.D.
Pathology, Microbiology, and Immunology

Richard Guyer  
Medical Year 3

Ian Macara, Ph.D.
Cell and Developmental Biology

Kevin Ha  
Medical Year 4

Michael Goldfarb, Ph.D.
Mechanical Engineering

Andrew Hale  
Medical Year 1

Rachana Haliyur  
Graduate Year 2

Al Powers, Ph.D.
Molecular Physiology and Biophysics

Ali Hanson,  
Medical Year 4

Ethan Lee, M.D., Ph.D.
Cell and Developmental Biology

Melissa Harintho  
Graduate Year 2

R. Stokes Peebles, M.D.
Pathology, Microbiology, and Immunology

Nick Harris  
Graduate Year 1

Danny G. Winder, Ph.D.
Molecular Physiology and Biophysics

Merla Hubler  
Graduate Year 2

Alyssa Hasty, Ph.D.
Molecular Physiology and Biophysics

Troy Hutchens  
Graduate Year 4

David Piston, Ph.D.
Chemical and Physical Biology

Lillian Johnson  
Graduate Year 2

Eric Skaar, Ph.D.
Pathology, Microbiology, and Immunology

Sumeeth Jonathan  
Medical Year 2

Daniel Kashima  
Graduate Year 2

Brad Grueter, Ph.D.
Neuroscience

Jacob Kaufman  
Medical Year 4

David Carbone, M.D.
Cancer Biology

Lindsay Klofas  
Medical Year 1

Byron Knowles  
Medical Year 3

Jim Goldenring, M.D., Ph.D.
Cell and Developmental Biology

Jonathan Knowlton  
Graduate Year 1

Terry Dermody, M.D.
Pathology, Microbiology, and Immunology

Katherine Konvinse  
Medical Year 2

Mary Ellen Koran  
Medical Year 3

Tricia Thornton-Wells, Ph.D.
Human Genetics

Krystian Kozek  
Graduate Year 1

Weaver, David, Ph.D.
Pharmacology

Kevin Kumar  
Medical Year 3

Aaron Bowman, Ph.D.
Neurosciences

Caroline Lai  
Medical Year 4

Terry Dermody, M.D.
Pathology, Microbiology, and Immunology
<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Degree</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaron Lim</td>
<td>Medical 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael Litt</td>
<td>Graduate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roger Cone, Ph.D.</td>
<td></td>
<td></td>
<td>Molecular Physiology and Biophysics</td>
</tr>
<tr>
<td>Joe Luchsinger</td>
<td>Medical 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MariaSanta Mangione</td>
<td>Graduate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kathy Gould, Ph.D.</td>
<td></td>
<td></td>
<td>Cell and Developmental Biology</td>
</tr>
<tr>
<td>Victoria Martucci</td>
<td>Medical 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Scott McCall</td>
<td>Graduate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billy Hudson, Ph.D.</td>
<td></td>
<td></td>
<td>Pharmacology</td>
</tr>
<tr>
<td>R. Anthony McClure</td>
<td>Graduate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wellington Pham, Ph.D.</td>
<td></td>
<td></td>
<td>Neuroscience</td>
</tr>
<tr>
<td>Matthew McKenna</td>
<td>Graduate 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas Yankeelov, M.D., Ph.D.</td>
<td></td>
<td></td>
<td>Biomedical Engineering</td>
</tr>
<tr>
<td>Catherine Meador</td>
<td>Graduate 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>William Pao, M.D., Ph.D.</td>
<td></td>
<td></td>
<td>Cancer Biology</td>
</tr>
<tr>
<td>Jason Metcalf, Ph.D.</td>
<td>Medical 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seth Bordenstein, Ph.D.</td>
<td></td>
<td></td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>Kelli Money</td>
<td>Graduate 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gregg Stanwood, Ph.D.</td>
<td></td>
<td></td>
<td>Neuroscience</td>
</tr>
<tr>
<td>Carrie Buchanan Moore</td>
<td>Medical 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marylyn Ritchie, Ph.D.</td>
<td></td>
<td></td>
<td>Human Genetics (PSU)</td>
</tr>
<tr>
<td>Melissa Musser</td>
<td>Medical 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michelle Southard-Smith, Ph.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caroline Nebhan</td>
<td>Medical 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>William Pao, M.D., Ph.D.</td>
<td></td>
<td></td>
<td>Cancer Biology</td>
</tr>
<tr>
<td>Brian Palmisano</td>
<td>Graduate 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Stafford, M.D., Ph.D.</td>
<td></td>
<td></td>
<td>Molecular Physiology and Biophysics</td>
</tr>
<tr>
<td>Bobak Parang</td>
<td>Graduate 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chris Williams, M.D., Ph.D.</td>
<td></td>
<td></td>
<td>Cancer Biology</td>
</tr>
<tr>
<td>Shah Parikh</td>
<td>Graduate 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas Force, M.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matt Puccetti</td>
<td>Graduate 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christine Eischen, Ph.D.</td>
<td></td>
<td></td>
<td>Pathology, Microbiology and Immunology</td>
</tr>
<tr>
<td>Matt Stier</td>
<td>Graduate 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. Stokes Peebles, M.D.</td>
<td></td>
<td></td>
<td>Pathology, Microbiology, and Immunology</td>
</tr>
<tr>
<td>Blair Stocks</td>
<td>Graduate 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cody Stothers</td>
<td>Medical 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ayaka Sugiura</td>
<td>Medical 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Alexandra Sundermann  
Medical Year 2

Matthew Surdel  
Graduate Year 3

Eric Skaar, Ph.D.  
Pathology, Microbiology, and Immunology

Pratik Talati  
Graduate Year 3

Stephan Heckers, M.D.  
Neuroscience

Jarred Tanksley  
Medical Year 4

Robert Coffey, Ph.D.  
Cell and Developmental Biology

Pedro Teixeira  
Graduate Year 4

Joshua Denny, M.D.  
Biomedical Informatics

Joshua Thompson  
Medical Year 2

Petria-George Thompson  
Medical Year 1

David Tovar Argueta  
Medical Year 1

Obi Umunakwe  
Medical Year 3

Michael Laposata, M.D., Ph.D.  
Pathology, Microbiology, and Immunology

Jacob VanHouten  
Graduate Year 5

Thomas Lasko, Ph.D.  
Biomedical Informatics

Jack Walker  
Medical Year 1

Jennifer Watchmaker  
Graduate Year 1

H. Charles Manning, Ph.D.  
Chemical and Physical Biology

Sherry Wen  
Graduate Year 4

John Williams, M.D.  
Pathology, Microbiology, and Immunology

Nichelle Winters  
Medical Year 4

David Bader, Ph.D.  
Cell and Developmental Biology

Patrick Wu  
Medical Year 1

Yuantee Zhu  
Graduate Year 2

Florent Elefteriou, Ph.D.  
Pharmacology
XXIX. Departmental Coursework and Requirements for the Ph.D. Degree

Department of Biochemistry

<table>
<thead>
<tr>
<th>Medical School</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture (BCHM 8381)</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis (BCHM 8382)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction (BCHM 8381)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (BCHM 8384)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall (G1)</strong></td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Seminar / Scientific Communication (BCHM 8327)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring (G1)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12 didactic hours

24 didactic hours

Up to 12 of hours may be transferred from the Medical School coursework, but must be transferred to a specific course in consultation with the Director of Graduate Study. The MSTP seminar will count as didactic credit within Biochemistry for the first year of the Ph.D. (2 hours maximum). MSTP students are required to take BCHM 8327 Seminar/Scientific Communication (2 hours). This will leave 10 hours of didactic credit needed for the Ph.D. degree in Biochemistry. Students may take any electives to fulfill this requirement. Electives should be chosen based on student’s interest and in consultation with the mentor.

**Qualifying Examination:** The QE is taken in the late spring of the first graduate. It is a two-part exam. Part I consists of a written proposal of original research and an oral defense of the proposal. This proposal may not be the student’s thesis research. Part II is a written and oral presentation of the student’s thesis proposal to their dissertation committee.
Department of Biological Sciences

<table>
<thead>
<tr>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
</table>

**Medical School**
Foundations of Medical Knowledge (VMS I)

**Fall**
- Human Blueprint and Architecture (BCHM 8381) 5
- Microbes and Immunity 1
- Homeostasis (BCHM 8382)
- MSTP Seminar (MSTP 8310)

**Spring**
- Endocrine, Digestion, and Reproduction (BCHM 8381) 2
- Brain, Behavior, and Movement (MIB 8384) 1
- MSTP Seminar (MSTP 8310) 1

**Summer**
- Special Topics/Advanced Tech in Bio Sciences (BSCI 8390) 4

**Fall**
- Graduate Seminar in Biological Sciences (BSCI 8320) 3-7
- Electives 2-6
- MSTP Seminar (MSTP 8310) 1

**Spring**
- Graduate Seminar in Biological Sciences (BSCI 8320) 3-7
- Electives 2-6
- MSTP Seminar (MSTP 8310) 1

**Qualifying Examination.** The QE can be taken after a student fulfills the departmental course requirements and reaches a minimum of 24 didactic credits in good standing (cumulative GPA of 3.0 or above). All requirements must be completed before October 15 of the third year. The overall goals of the qualifying exam are to 1) assess the student’s ability to formulate hypotheses and design specific aims to test these hypotheses, 2) test the student’s knowledge in scientific literature relevant to the Ph.D. dissertation, 3) assess the student’s general knowledge base, 4) provide training/feedback in the grant writing process, and 5) to form a thesis committee to foster and monitor the student’s continued development. The exam consists of a written component in the form of a thesis proposal and an oral component in which questions related to the specific proposal, the research area, and the broader background may be asked.
Department of Biomedical Engineering

<table>
<thead>
<tr>
<th>Medical School</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Blueprint and Architecture (BCHM 8381)</td>
<td>6</td>
</tr>
<tr>
<td>Homeostasis (CBIO 8382)</td>
<td>6</td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocrine, Digestion, and Reproduction</td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (NURO 8384)</td>
<td>3</td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graduate School</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fall</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Engineering (core) courses</td>
<td>6</td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Engineering (core) courses</td>
<td>9</td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
</tr>
</tbody>
</table>

BME Coursework: For the Ph.D. degree in BME, 27 semester hours of graduate coursework must be completed. MSTP students will receive credit for 15 hours of graduate coursework from their medical school work and must complete 12 hours in biomedical engineering courses, at least 6 of which must be 8300-level courses. In some cases, a student’s Ph.D. thesis committee may require additional didactic course hours beyond the 27 required.

Research Hours: Because 72 credit hours must be completed in order to earn a Ph.D., the additional credit comes from research. Until students pass the preliminary examination, enrollment for non-candidate research credit (BME 8379) will be completed each semester. The maximum amount of total credit hours to be a full time student is 13 credit hours. The MSTP will only pay for a total of 24 credit hours during the first year of graduate school. Contact the DGS if any questions regarding research hours and registration.

Qualifying Examination. Students must pass a Qualifying Examination consisting of written and oral presentations of a proposal for doctoral research. This exam must be taken before the end of their 3rd academic year in graduate school.
<table>
<thead>
<tr>
<th>Medical School</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture (BCHM 8381)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis (MP&amp;B 8382)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction (PATH 383)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (MP&amp;B 8384)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Found. of Biomedical Informatics (BMIF 300)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Found. of Bioinformatics (BMIF 8310)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific Communication 1(BMIF 316a)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMIF Selective (choose 1: 311, 8320, 330, 340, 370, 380)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodological Found. of Biomedical Informatics</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMIF Selective (any 2: 8311/8320/8330/8340/8370/8380)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific Communication 1(BMIF 8316a)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summer and 2nd GS year, as needed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competency Areas (CS, Research Methods)</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Qualifying Examination</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Qualifying Examination. Students who are admitted directly to the doctoral program in Biomedical Informatics must take the qualifying examination no later than the end of the fourth calendar year in the program (including time spent completing requirements for the master’s degree). The Ph.D. committee determines the content and the format of the examination. Written exam format can vary but is usually in form of questions. The committee chair coordinates content among the other members. Students have one week to complete the written exam. The committee notifies the DGS of the time and place of the oral examination. The Ph.D. committee will decide the outcome of the qualifying exam by majority vote. Adequate performance in both written and oral portions of the exam is germane in this decision. Each student is allowed only
two opportunities to pass the examination (the topic-specific examinations described in ii below do not count as additional opportunities). Three possible outcomes may result from a qualifying examination attempt: Pass. The student's performance is satisfactory; Topic-specific deficiency. The student's performance in one or more topics is unsatisfactory. Remediation limited to the deficient topic(s) occurs within 4 weeks of the oral examination; Failure. The student's performance is unsatisfactory, and one week of clarification is insufficient to remedy the lack. The qualifying examination results forms, signed by the committee members and the DGS, shall be forwarded to the Graduate School immediately after the examination or in no case later than one month after the oral exam.
## Medical School

Foundations of Medical Knowledge (VMS I)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>GS Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Human Blueprint and Architecture (CANB 8381)</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>Homeostasis (CANB 8382)</td>
<td>5</td>
</tr>
<tr>
<td>Fall</td>
<td>Microbes and Immunity</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>MSTP Seminar</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>Endocrine, Digestion, and Reproduction (CANB 383)</td>
<td>5</td>
</tr>
<tr>
<td>Spring</td>
<td>Brain, Behavior, and Movement</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
</tr>
</tbody>
</table>

### Graduate School

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>GS Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Introduction to Cancer Biology (CANB 340)</td>
<td>2</td>
</tr>
<tr>
<td>Fall</td>
<td>Advanced Cancer Biology (CANB 342)</td>
<td>4</td>
</tr>
<tr>
<td>Fall</td>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
</tr>
<tr>
<td>Spring</td>
<td>Electives*</td>
<td>2</td>
</tr>
<tr>
<td>Spring</td>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
</tr>
</tbody>
</table>

---

### Qualifying Examination.

The qualifying exam for admission to Ph.D. candidacy consists of (1) Phase I: writing a mini-review in the thesis area, and (2) Phase II: writing a thesis proposal in the NIH-NRSA predoctoral format and defending the proposal orally before an examining committee of faculty. The main purpose of the exam is to determine whether the student possesses those critical and analytic skills needed for a scholarly career. It is also an important exercise in writing, communicating, and the grant writing process.
## Department of Cell and Developmental Biology

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
</table>

### Medical School
Foundations of Medical Knowledge (VMS I)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Description</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Human Blueprint and Architecture (CBIO 8381)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Homeostasis (CBIO 8382)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Microbes and Immunity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MSTP Seminar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Spring</td>
<td>Endocrine, Digestion, and Reproduction (CBIO 8382)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Brain, Behavior, and Movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MSTP Seminar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 didactic hours</td>
</tr>
</tbody>
</table>

### Graduate School

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Description</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Cell Biology (CBIO 8310)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MSTP Seminar</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Spring</td>
<td>Seminar in Cell Biology (CBIO 330)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Basic Biological Microscopy (CBIO 314)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MSTP Seminar</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 didactic hours</td>
</tr>
</tbody>
</table>

### Qualifying Examination
The overall goals of the qualifying exam in CDB are: 1) to assess the student’s ability to formulate a series of hypotheses and specific aims to test these hypotheses that will likely constitute the basis for a Ph.D. dissertation, 2) to immerse the student in scientific literature relevant to the Ph.D. dissertation, 3) to assess the student’s general knowledge base and aptitude for a research career, 4) to provide training in the grant writing process, and 5) to form a thesis committee to foster and monitor the student’s continued development.
## Program in Chemical and Physical Biology

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture (CPBP 8381)</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GI/Endocrine, Digestion, and Reproduction</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (CPBP 8384)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 didactic hours</td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chemical Biology Track</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td>16 didactic hours</td>
</tr>
<tr>
<td>Graduate Seminar in Chemical Biology (CPBP 8310)</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Foundations in Chemical Biology (CPBP 8320)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Chemistry Structure and Mechanism (CHEM 8320A)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>2+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>8</td>
<td>16 didactic hours</td>
</tr>
<tr>
<td>Tutorials in CPBP (CPBP 324)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 didactic hours</td>
<td>16 didactic hours</td>
</tr>
<tr>
<td><strong>Molecular Biophysics and Structural Biology Track</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>8</td>
<td></td>
<td>8 didactic hours</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Two of the following modules:</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Structural Biology (BCHM 300)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Membrane Protein Biology (CPB 307)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein-Protein Interactions (CPB 308)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutorials in CPBP (CPBP 324)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular Biophysics Seminar (BCHM 349)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Imaging Science Track**

**Fall**
- Foundations of Medical Imaging (BME 253) or Physics of Medical Imaging (Physics 228): 3 hours
- Quantitative Methods in BME (BME 301A-C): 3 hours
- Current Topics in Imaging Science (CPB 312): 1 hour

**Spring**
- Biological Basis of Imaging (BME 276): 3 hours
- Imaging Science Elective: 3 hours
- Tutorials in CPBP (CPBP 324): 1 hour
- MSTP Seminar (MSTP 8310): 1 hour
- Quantitative module (selected from Bioregulation or BME 301) or suitable seminar course: 1 hour

**Total Didactic Hours:** 16 didactic hours

**Systems Biology Track**

**Fall**
- Quantitative Systems Biology Course (select from list): 3 hours
- Topical Elective: 4 hours
- Systems Biology Seminar (course to be formed): 1 hour

**Spring**
- Quantitative Systems Biology Course (select from list): 3 hours
- Topical Elective: 3 hours
- Tutorials in CPBP (CPBP 324): 1 hour
- MSTP Seminar (MSTP 8310): 1 hour

**Total Didactic Hours:** 16 didactic hours

**Qualifying Examination.** Once students have completed twenty-four didactic hours of coursework, they are eligible to schedule a qualifying exam. Committee members are selected by students and approved by the Director of Graduate Study for their expertise in the students’ projects. Students will submit a ten page written proposal in the area of their dissertation research to the committee at least two weeks before exam. The proposal will follow the NRSA format guidelines. At the scheduled exam, students will defend their proposal and demonstrate general knowledge in the area of their dissertation research project for ninety minutes. At the conclusion of the exam, the committee will award a pass, fail, or conditional pass to students. If students fail the exam, they will have one additional opportunity to rewrite and defend the proposal. After passing the qualifying exam, students will be able to proceed with their research plan according to the aims approved by the exam committee. Students’ exam committee members will also serve as members of students’ dissertation committee.
## Program in Epidemiology

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School (Year 1)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causal Interference</td>
<td>3</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Epidemiologic Theory and Methods I</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Topics in Research</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles of Modern Biostatistics</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epidemiologic Theory and Methods II</td>
<td>4</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Modern Regression Analysis</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific Writing I</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content Area Elective</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Ethics</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

8-10 didactic hours*

<table>
<thead>
<tr>
<th></th>
<th>24 didactic hours*</th>
<th>TBD*</th>
</tr>
</thead>
</table>

The Qualifying Examination in the Ph.D. in Epidemiology Program is an oral defense of the dissertation proposal. To qualify for candidacy, a student must complete all of the required first and second year courses, must be in good academic standing (GPA ≥ 3.0), must pass the comprehensive examination, and must pass an oral qualifying examination. The examining committee is the student’s dissertation committee. The examining committee assesses the written proposal and oral defense by rating the success of the student in the following components: 1. Familiarity with research literature; 2. Ability to organize scientific data; 3. Critical thinking skills; 4. Mastery of principles and methodology proposed; 5. Oral presentation of proposal; 6. Ability to interpret and answer questions appropriately.

* To be determined
## Program in Human Genetics

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture (HGEN 8381)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis (HGEN 8382)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (HGEN 8384)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 didactic hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Genetics I (HGEN 8340)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutorials in Human Genetics (HGEN 8370)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutorials in Statistics and Population</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetics (HGEN 8371)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Genetics II (HGEN 8341)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetics Interest Group (HGEN 8335)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 didactic hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26 didactic hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Qualifying Examination.** To qualify for candidacy, a student must complete all of the required first and second year courses, must be in good academic standing (GPA ≥ 3.0), and must pass a two-part oral candidacy examination. The qualifying examination will be taken by the end of the summer between the second and third years of entry into the graduate school. Examination Part I: The first part of the candidacy process is a ninety minute oral examination testing general knowledge in the field of genetics and related topics. Examination Part II: The second part of the candidacy examination is a ninety minute oral defense of the student’s thesis proposal.
### Department of Molecular Physiology and Biophysics

<table>
<thead>
<tr>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 didactic hours</td>
<td>24 didactic hours</td>
<td></td>
</tr>
</tbody>
</table>

#### Medical School
Foundations of Medical Knowledge (VMS I)

**Fall**
- Human Blueprint and Architecture (MP&B 8381) 5
- Microbes and Immunity
- Homeostasis (MP&B 8382) 2
- MSTP Seminar

**Spring**
- Endocrine, Digestion, and Reproduction (MP&B 8382) 2
- Brain, Behavior, and Movement (MP&B 8384) 2
- MSTP Seminar 1

#### Graduate School

**Fall**
- Tutorials in Physiology (MPB 8324) 1
- Electives 5
- MSTP Seminar

**Spring**
- Tutorials in Physiology (MPB 8324) 1
- Electives 5

**Qualifying Examination.** Students are admitted to candidacy following demonstration of: a) broad and integrative knowledge of physiology, and b) the ability to think creatively and critically in a research area of their choice. Student must demonstrate broad and integrative knowledge of physiology. Evaluation of the oral will be pass/fail and failure will result in dismissal from the program. Creativity and critical-thinking skills will be assessed in the Candidacy Examination, which consists of the preparation of a written research proposal on a topic of the student's choosing, followed by an oral defense. Students must have completed their required didactic course work (24 hours in Ph.D. program with a minimal overall didactic GPA of 3.0) and must have demonstrated an integrative knowledge in physiology (see above) before they can proceed to the Candidacy Examination.
### Program in Neuroscience

<table>
<thead>
<tr>
<th>Medical School</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis (CBIO 8382)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction (CBIO 8382)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (NURO 8384)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroscience Discussions I (NURO 8325)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroscience Elective</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems Neuroscience</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroscience Forum (NURO 8320)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular and Molecular Neurosciences (NURO 8345)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroscience Discussions II (NURO 8325)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroscience Forum (NURO 8320)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Qualifying Examination.** The Ph.D. qualifying process consists of two major phases that should typically be completed in the third year of graduate training. Successful qualification represents the final checkpoint for admission into candidacy for a Ph.D. degree. The purpose of the qualifying examination is to test the student’s general knowledge of neuroscience and familiarity with published research related to their dissertation project, and to outline and defend the goals and objectives of their proposed dissertation research. MSTP students take the preliminary examination after the G1 year.
## Medical School

Foundations of Medical Knowledge (VMS I)

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis (PATH 8383)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction (PATH 8383)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14 didactic hours

## Graduate School

<table>
<thead>
<tr>
<th></th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar in Experimental Pathology (PATH 8331)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular and Molecular Basis of Disease (PATH 8351B)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Topics in Experimental Pathology (PATH 8332)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals in Scientific Communication (PATH 8333)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellular and Molecular Basis of Disease (PATH 8351A)</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10 didactic hours

## Qualifying Examination

Upon completing 24 hours of didactic work, students begin preparations for Phase I of the Qualifying Exam, which should be completed in the summer of the second year. A Thesis Advisory Committee is appointed for the student, and this committee administers Phase I and II of the Qualifying Exams. Our exam process is unique relative to most departments in that the Thesis Advisory Committee facilitates the progress of the research component of the student’s education, providing oversight and direction throughout the student’s training. The purpose of the Phase I Qualifying Examination is twofold: a) To test the student’s ability to define a basic scientific research question, evaluate relevant literature, and propose critical experiments to address the question; b) To test the student’s depth and breadth of...
knowledge of basic cell and molecular pathology. For this examination, the student is required to
develop a novel proposal based on the research she/he plans to undertake in the Thesis Advisor’s
laboratory and defend the proposal before the Thesis Advisory Committee. For Phase II of the
Qualifying Examination, the student must develop a dissertation research proposal in the format
of an NIH R01 grant application. The proposal could be an extension or refinement of work
proposed in Phase I or could be based on a new research direction as decided by the student and
her/his mentor. With the passing of this examination the student is admitted to candidacy for the
Ph.D. degree. By the regulations of the Graduate School the candidate has a maximum of 4 years
from the date of passing the qualifying examination to complete the Ph.D. degree. The Phase II
Qualifying Examination should be completed preferably in the fall but no later than the spring
semester of the third year.
## Department of Pathology, Microbiology, and Immunology

### Program in Microbiology and Immunology

<table>
<thead>
<tr>
<th>Medical School</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture*</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeostasis *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity (M&amp;IM 8328)</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graduate School</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations in Microbiology and Immunology (M&amp;IM 8332)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations in Microbiology and Immunology (M&amp;IM 8333)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations in Microbiology and Immunology (M&amp;IM 8334)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant Writing (M&amp;IM 8335 )</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Elective courses in other departments may be taken with the approvals of the mentor and DGS. Either BCHM 8381, CBIO 8381, or other departmental courses will be transferred for credit depending upon the research focus of the student. The mentor and DGS will designate which courses and hours are transferred prior to the student matriculating.

### Qualifying Examination

The Qualifying Examination for the graduate program in Microbiology and Immunology is designed to test (i) the student’s knowledge in their field of specialization, (ii) general knowledge in the field of Microbiology and Immunology, and (iii) critical thinking and analytical skills. The examination is conducted by the student’s Ph.D. committee. The exam requires the student to submit a written dissertation proposal, followed by an oral defense of the proposed thesis. Successful completion of the Qualifying Examination promotes a student to the “Ph.D. Candidate” status. The program also provides opportunities to develop scientific communication skills via weekly student-directed seminars.
### Medical School

<table>
<thead>
<tr>
<th>Course</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Medical Knowledge (VMS I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Blueprint and Architecture</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Homeostasis (PHAR 8320)</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Microbes and Immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Endocrine, Digestion, and Reproduction (PHAR 8320)</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Brain, Behavior, and Movement (MP&amp;B 8384)</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Graduate School**

<table>
<thead>
<tr>
<th>Course</th>
<th>GS Credit Hours</th>
<th>Semester Total</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summer</strong></td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Non-Candidate Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Communications I (PHAR 8322A)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Drug Metabolism &amp; Pharmacokinetics (DMPK) (PHAR 8320)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Biostatistics (IGP 8300B)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Receptors (IGP 8300B)*</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Communications II (PHAR 8322B)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSTP Seminar (MSTP 8310)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Summer</strong></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Receptors (PHAR 8324)*</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Qualifying Examination (QE).** Part I of the QE is an oral examination of seven topics primarily based upon the didactic material covered in required courses. Questions are developed by faculty serving as course directors or as section lecturers. During the 24 hours preceding the examination, no written materials may be consulted, however students may choose to prepare diagrams or other aids that would be effective in conveying an answer to the examination committee. Part II of the QE consists of a concise paper reviewing the background literature relevant to the student’s projected dissertation research. Part II will be completed with an oral examination of the proposed research in the written document.