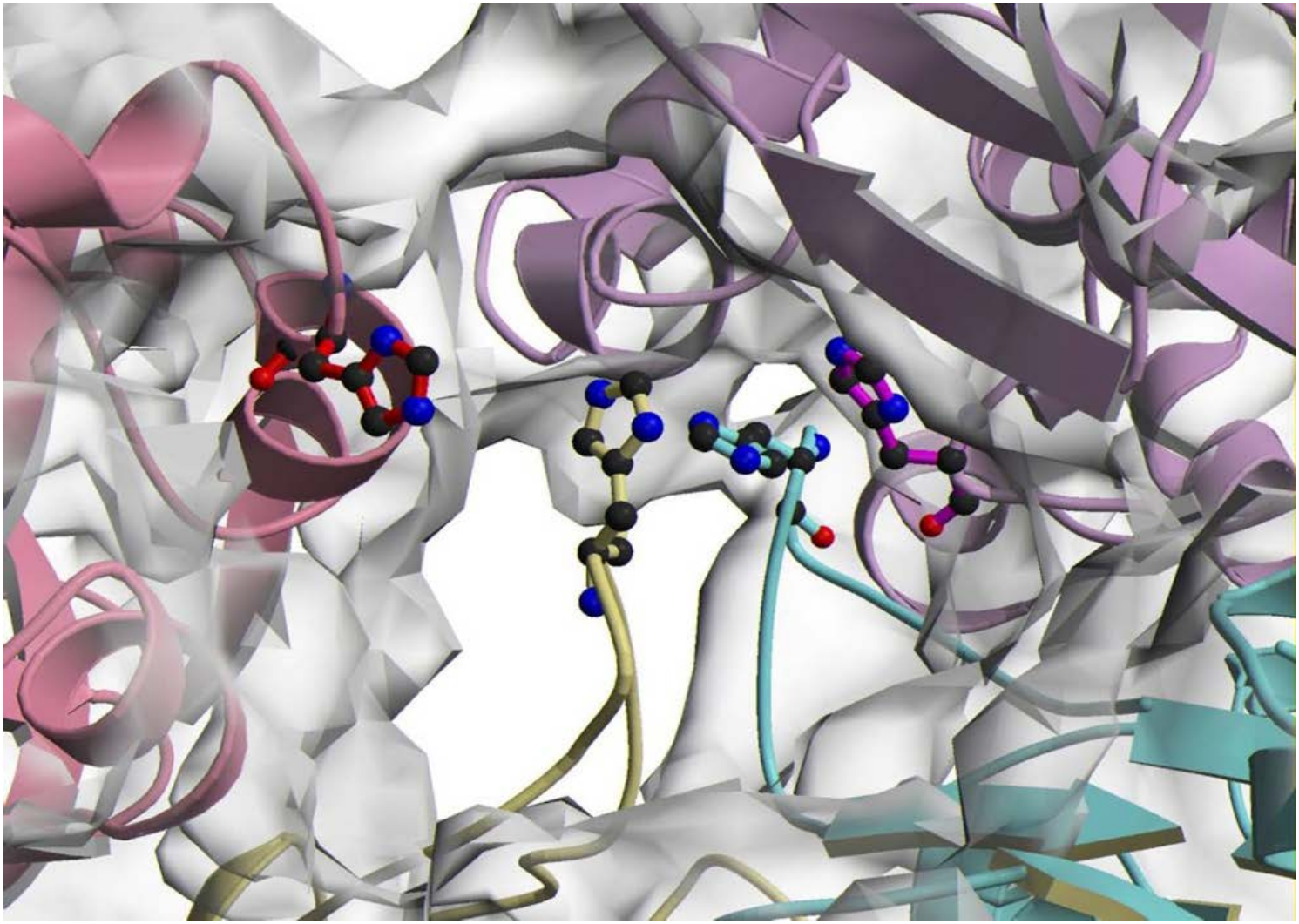
Molecular Biophysics & Structural Biology Graduate Program



Student Handbook
2026-2027 Academic Year

Welcome and Preface

Welcome to the Molecular Biophysics & Structural Biology Graduate Program. Molecular biophysics is an exciting interdisciplinary research field at the intersection of physics, chemistry, biology, and medicine. The Program integrates faculty across many schools and departments at the University of Pittsburgh as well as Carnegie Mellon University. The Program started in the fall of 2004 and is still evolving. This handbook outlines the organization of the Program and details information about our policies and guidelines.

The Molecular Biophysics and Structural Biology Graduate Program is committed to providing a progressive educational experience. Our exceptional resources and research environment offers outstanding training opportunities. An overall objective of our Program is to train students in the dynamically evolving molecular biophysics field so our graduates will have a broad range of career options. Our program is actively evolving so be sure to check our website frequently for updated graduate program information. Please also be sure to attend periodic town hall meetings to learn about Program updates and to provide your input into Program governance!

We welcome you to the Program and look forward in working with you to reach your educational goals.

Andrew Hinck, PhD, Program Co-Director
Maria Kurnikova, PhD, Program Co-Director
Molecular Biophysics & Structural Biology Graduate Program

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1. Roster of Program Faculty and Staff

Program Co-Directors:

Andrew Hinck, Ph.D. Program Co-Director (412-648-8533; ahinck@pitt.edu)

Maria Kurnikova, Ph.D. Program Co-Director (412-268-9772; kurnikova@cmu.edu)

Program Coordinator:

Mr. John DiRicco, Department of Structural Biology, University of Pittsburgh, School of Medicine (412-648-4253; JVD38@pitt.edu)

Training Faculty:

University of Pittsburgh, Dietrich School of Arts & Sciences

Department of Biological Sciences

Jeffrey Brodsky
Anne Carlson
Jacob Durrant
Andrew VanDemark

Department of Chemistry

W. Seth Childers
Lillian Chong
Rob Coalson
Alexander Deiters
Seth Horne
Kabirul Islam
Grace Kenny
Kazunori Koide
Sunil Saxena
Peter Wipf

University of Pittsburgh School of Medicine

Department of Anesthesiology and Perioperative Medicine

Pei Tang
Yan Xu

Department of Cell Biology and Physiology

Sanford Leuba
Jay Xiaojun Tan
Matthew Wohlever

Department of Computational and Systems Biology

Fritz Roth

Department of Immunology

Jason Lohmueller

Department of Microbiology and Molecular Genetics

Saleem Khan
Kevin McCarthy
Patrick Moore
Thomas Smithgall

Department of Pharmacology and Chemical Biology

William Furey
Bennett Van Houten
Patricia Opresko
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Department of Structural Biology

Ümit Akbey
Guillermo Calero
Jonathan Coleman
James Conway
Angela Gronenborn
Andrew Hinck
Rieko Ishima
Stella Sun

University of Pittsburgh, Graduate School of Pharmacy

Department of Pharmaceutical Sciences

Simone Bixius-Anderko
Junmei Wang

Carnegie Mellon University, Mellon College of Science

Department of Biological Sciences:

Gordon Rule
Huaiying Zhang
Yongxin (Leon) Zhao

Department of Chemistry

Olexandr Isayev
Maria Kurnikova

Department of Physics

Markus Deserno
Stephanie Tristram-Nagle

2. Policies and Resources

Policies and Resources for MBSB Students in the University of Pittsburgh School of Medicine:

The following policies and resources apply to ALL graduate students at the University of Pittsburgh School of Medicine. Students must familiarize themselves with these policies. Ignorance of any policy will not be accepted as an excuse for violation. Policies and Resources can be found at https://somgrad.pitt.edu/policies-and-resources-school-medicine-graduate-students

- Leave of Absence
- Graduate Student Parental Accommodations Guidelines
- Financial Aid
- Educational Enrichment Account (for PhD programs who offer this)
- External Support for Graduate Students
- Tuition
- University of Pittsburgh Code of Conduct
- Academic Integrity Guidelines
- Research Integrity Policy
- Bias/Mistreatment
- Office of the Learning Environment (OLE)
- School of Medicine Ombuds Office
- Title IX
- Biomedical Graduate Student Association
- Graduate Student Unionization
- Drug and Alcohol Policies and Resources
- Building Emergency or Inclement Weather Policy for Students
- University Resources

Similar Policies and Resources for MBSB Students in the University of Pittsburgh Dietrich School of Arts and Sciences and Carnegie Mellon University Mellon College of Science are available through these online resources:

University of Pittsburgh Dietrich School of Arts and Sciences,
https://www.asgraduate.pitt.edu/academics/academic-resources

Carnegie Mellon University Graduate Student Policy Handbooks for the Departments of Chemistry, Physics, and Biological Sciences in the Mellon College of Science:
https://www.cmu.edu/chemistry/grad/forms_policies/handbook.html
https://www.cmu.edu/bio/graduate/current_students/forms/files/phd_handbook.pdf
https://www.cmu.edu/physics/graduate-program/physics_gradprogram_handbook_2023-1.pdf

3. Program Structure

The main work of running the graduate program falls to committees under the direction of the Program Co-Directors. The Program Co-Directors take a leadership role in ensuring the quality of the Graduate Program; serve as a liaison with the chairs of relevant departments and with the deans of the participating schools; facilitate communication among members of the Steering Committee and its subcommittees; implement standard Graduate Program policies; and oversees the routine operation of the Graduate Program. The Program Co-Directors also serve as the primary interface between the committees and the students.

Committees

1. Steering Committee:
On a high level, the MBSB Steering Committee will ensure the interdisciplinary goals and focuses of the program are maintained. The committee will also make certain that the quality of graduate student training remains consistently high throughout the program. The Steering Committee will make individual decisions regarding requests for major shifts in a student's direction, including 1) requests to change dissertation advisors or membership of dissertation committees, and 2) recommendations by advisors or dissertation committees for student termination. The committee will vote to accept new members into the MBSB Training faculty, review program issues and develop proposals for policy revision when needed or suggested by other MBSB program committees.

Current members:

- Andy Hinck (Co-Chair)
- Maria Kurnikova (Co-Chair)
- Rieko Ishima
- Tom Smithgall
- Seth Horne
- Jonathan Coleman
- Ben Van Houten
- Matthew Wohlever

2. Curriculum Committee: This committee is responsible for monitoring the level, breadth and effectiveness of the curriculum, to propose changes where necessary; to coordinate with departments with participating faculty to maintain the courses and/or effect changes in them; and to interact closely with the faculty in the development of new courses. Requests for changes in the curriculum, either of course content or the deletion or addition of courses, are brought to this committee.

Current Members:

- Ben Van Houten (Chair)
- Lillian Chong
- Ümit Akbey
- Fritz Roth
- Gordon Rule
- Emma DiBernardo (Student Representative)

3. Admissions Committee: The Admission Committee is responsible for the graduate student admissions in the program. Applicants will be reviewed by committee, interview qualified candidates and recommend admission to the Program Co-Directors. In addition, the admissions committee tracks the success of the admissions process each year by maintaining pertinent information on the applicants. Recommendations for change in the standards for admission are made to the steering committee.

Current members:

- Rieko Ishima (Co-Chair)
- Tom Smithgall (Co-Chair)
- James Conway
- Seth Childers
- Jonathan Coleman

4. Recruiting Committee: The Recruiting committee oversees the development and maintenance of the MBSB graduate program web site; identify and directly contact potential students and develop and distribute promotional materials such as brochures and posters. Additional responsibility of this committee is to plan and oversee general recruiting efforts which may include scheduling of outside seminars, mailings, phone calls, etc as means of advertising the graduate program. The committee also works with the admissions committee to recruit outstanding applicants during the interview weekends. Finally, the committee may plan information for booths at conferences and manning of such to field questions.

Current Members:

- Jonathan Coleman (Chair)
- Rieko Ishima
- Guillermo Calero
- Grace Kenney

5. Oversight and Evaluations Committee: The Oversight and Evaluation committee is responsible for monitoring the progress of each graduate student. It prompts interim advisors to review the progress of first year students, which includes a brief written assessment after the first term. This committee conducts the first–year student evaluation and facilitates the comprehensive exam process according to the schedule described below. The committee also evaluates student progress annually thereafter to ensure necessary coursework has been satisfied, annual dissertation committee meetings have been held, etc. Any problems detected are brought to the attention of the student, dissertation advisor and Program Co-Directors.

Current members:

- Seth Horne (Chair)
- Jason Lohmueller
- Simone Brixius-Anderko
- Gordon Rule

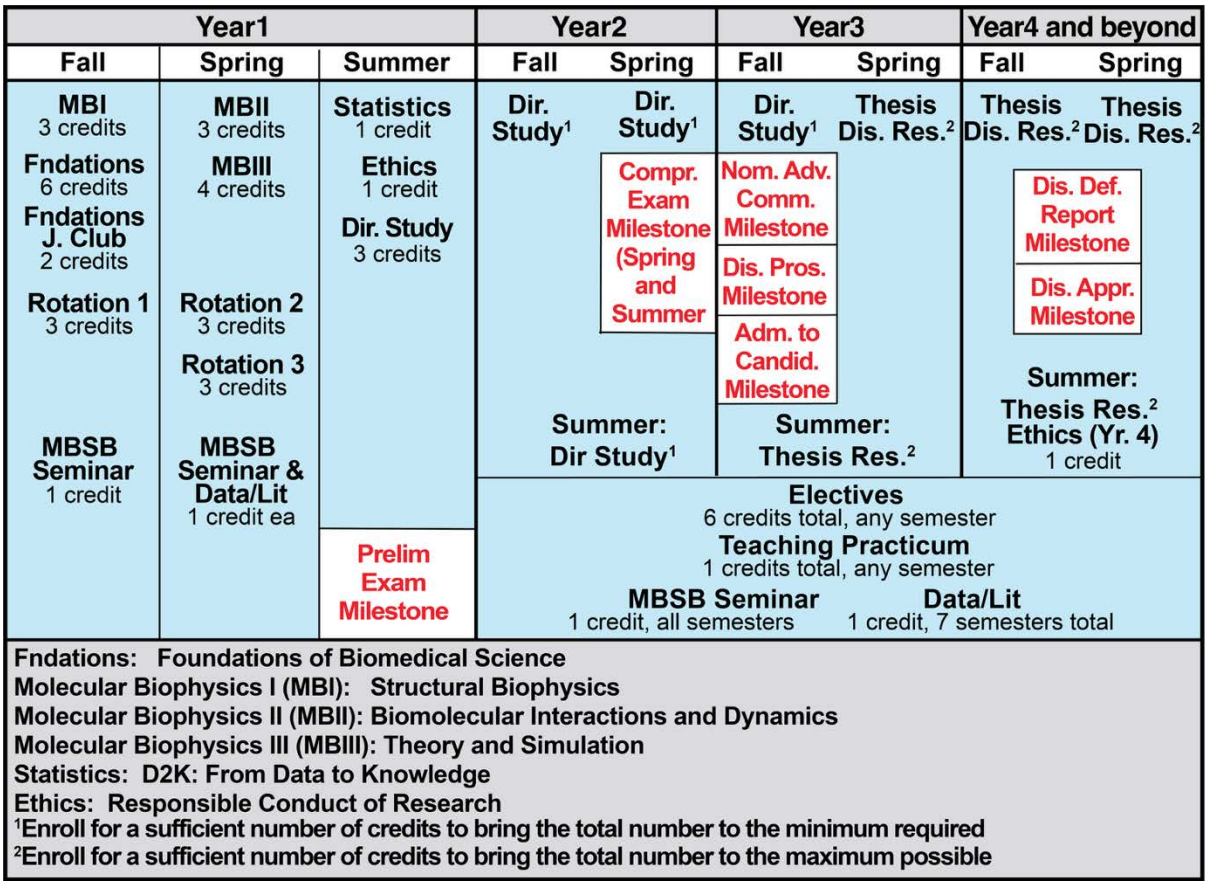
- Pei Tang

6. Seminar Committee: The seminar committee organizes the MBSB seminar series held during the fall and spring terms. The committee is responsible for soliciting suggestions for seminar speakers from the training faculty and students and selecting from these speakers that will present diverse topics in contemporary areas of structural biology and biophysics that are of benefit to both the training faculty and students.

- Matthew Wohlever (Chair)
- Sunil Saxena
- Angela Gronenborn
- Stella Sun
- Huaiying Zhang
- Peiyun Sang (Student Representative)

4. Program Coursework and Plan of Study

A Summary of the *coursework*, *plan of study*, and *milestones* for the Molecular Biophysics and Structural Biology Graduate Program is provided in the diagram below; details for the courses and plan of study follow. Milestones are further described in **Section 6**.



Coursework for the MBSB Graduate Program

Year I:

Entering Students: Entering students in the Molecular Biophysics & Structural Biology Graduate Program are primarily students in the target pool who have a strong interest in structural and physical areas of biology including X–ray crystallography, NMR, molecular dynamics and related computational areas, thermodynamics, kinetics, etc. The first-year curriculum is designed to build upon this foundation with a series of courses that provide detailed background in relevant areas of biophysics and structural biology.

Molecular Biophysics I (MBI): Structure (3 credits)

Molecular Biophysics II (MBII): Molecular Interactions & Dynamics (3 credits)

Molecular Biophysics III (MBIII): Molecular Modeling & Computational Chemistry (4 credits)

The three courses listed above, together with Foundations of Biomedical Science and rotations listed below, constitute the core coursework for the first year: Molecular Biophysics I is taken in the Fall Semester of the first year, while Molecular Biophysics II and III are taken in the Spring Semester of the first year. Collectively they cover the theories, techniques and seminal observations that form the foundation of molecular biophysics. The primary format is a team-taught lecture series, however, that is augmented with laboratory and hands-on demonstrations, review and discussion of grant applications and their reviews, and examples from the current literature presented by the students themselves in a Journal Club format. The division into the three areas of structure, interactions and dynamics is obvious in the case of some of the subtopics considered, less so for others, in part because of the many overlaps and interconnections within the field. The complete series represents a comprehensive introduction to molecular biophysics at the graduate level. The course series will combine several similar courses currently offered in the School of Medicine, Dietrich School of Arts & Sciences at the University of Pittsburgh and Carnegie Mellon University.

Topics covered include DNA, RNA and protein structure (as determined by NMR, X-ray and Cryo-EM techniques), the structural dynamics of proteins and nucleic acids, protein folding, protein-ligand binding (including cooperativity and allostery), protein-protein and protein-nucleic acid interactions, virus structure and assembly, membrane biophysics including the properties and behavior of ion channels and receptor biophysics. These problems are studied together with fundamental physical principles including statistical mechanical, thermodynamics and kinetics. Emphasis will also be placed on the experimental and computational methods underpinning the preceding. Topics here will include NMR, X-ray crystallography, Cryo-EM, numerically intense computational methods including molecular dynamics and free energy calculations, bioinformatics methods, spectroscopy, enzyme kinetics, experimental thermodynamic and calorimetric methods. An important goal of the courses is to integrate the individual topics into a coherent picture of this emerging discipline.

Foundations of Biomedical Science (6 credits)

Foundations of Biomedical Science Journal Club (2 credits)

The two courses above provide a broad overview of biomedical science and are required for all MBSB students. The Foundations course is divided into blocks, with the first focused on the structure and function of proteins, the second on gene structure, expression, and regulation, the third on cell and membrane biology, and the fourth on cell signaling. The Foundations Journal Club course focuses on analyzing these topics in the context of the current published literature.

Molecular Biophysics & Structural Biology Seminar (1 credit): This class provides exposure to a width breadth of contemporary biophysics and structural biology by leading experts in their respective areas of specialization. Students are expected to successfully attend this class in the Fall and Spring semester throughout their tenure within the program.

Research Rotations (3 credits each): Laboratory research is a major component of the MBSB graduate program. Research rotations should be considered an invaluable resource for learning broad-based skills at the bench as well as an opportunity to focus your scientific interests.

The First Year Advisor and Program Co-Directors supervise the selection of laboratory research rotations. Each student is expected to complete three (3) research rotations during the first year. It is required that three rotations of eight-week durations be performed in three different laboratories headed by training faculty of the Molecular Biophysics & Structural Biology Graduate Program. The first rotation starts approximately eight weeks after the start of the first semester, to allow the students some time to acclimate to the structure of the program and classes. The second and third rotations are during the first and second half of the Spring semester. Rotations provide students with an opportunity to identify an area of research interest, to establish a relationship with a potential dissertation advisor, and to learn various laboratory techniques. Students are therefore expected to place a major emphasis on their laboratory research in order to allow for mutual evaluation by the student and their advisor.

- Performance in lab rotation will be evaluated based on effort in the lab, ability to think independently, communicate effectively with the advisor and lab members, good citizenship in the lab, and a broad understanding of ongoing research in the laboratory. A well-written rotation report summarizing the experiments performed, results obtained, as well as an explanation of the progress of the research participated in, and why or why it did not succeed. It is recognized that some rotation projects emphasize concepts and techniques rather than generating a large volume of data. Thus, considerable flexibility in the style and content of the report is possible. The main goal is to generate a written, scholarly account of the scientific principles, questions, and activities undertaken during the rotation period. Rotation advisors will read, comment upon, and discuss changes to the rotation report with the student. When the written report is complete, the rotation supervisor will review the performance of the student and assign a letter grade for the rotation on the evaluation form provided by the Graduate Studies Office.

    - To receive an *A* grade in a rotation, a student must have performed at an excellent level in at least half of the criteria described above. Special emphasis for grading should be put on: effort in the lab, an understanding of the ongoing research that the student is engaged in, interpersonal skills, and a well-written rotation report.
    - A *B* grade is appropriate when a student has performed at least to an acceptable level in most/all the criteria.
    - To receive a *C* grade or below, a student must have performed at an unacceptable level in a number of above criteria.

- Prior to choosing a laboratory, you should speak with your first-year advisor/mentor and examine the list of faculty who have space and funding available to take a student in their laboratory.
- After the completion of the third rotation, a student is expected to have identified a dissertation advisor based on their rotation experiences and mutual agreement with a faculty member. You should initiate your research in your chosen advisor's laboratory no later than June 1.
- Identification of a dissertation laboratory for thesis research is a requirement to pass the preliminary examination at the end of first year of a PhD program.

Dates and reporting deadlines for the three rotations are as follows:

Rotation 1 (Oct. 19 to Dec. 11) A copy of rotation report must be submitted to the MBSB rotation mentor on the last day of the rotation.

Rotation 2 (Jan. 11 to Mar. 5) A copy of rotation report must be submitted to the MBSB rotation mentor on the last day of the rotation.

Rotation 3 (Mar. 8 to April 30) A copy of rotation report must be submitted to the MBSB rotation mentor on the last day of the rotation.

Data & Literature Club (1 credit): The course aims to (a) discuss students' data rigor and reproducibility, (b) literature in Molecular Biophysics and/or Structural Biology Field, and (c) Responsible Conduct of Research and the Career Development. Students are expected to successfully attend this class, total seven semesters throughout their tenure within the program; typically, attendance begins in the Spring semester of the first year and is contiguous, but only the former is required.

Scientific Ethics and the Responsible Conduct of Research (1 credit): This course is an introduction to the basic ethical issues which arise in the course of conducting scientific research. The course will be composed of informal lecture presentations followed by discussion issues in small groups. This course is taken in the summer semester of the first year.

D2K: From Data to Knowledge-Biomedical Experimental Design and Analysis (1 credits): This course discusses techniques for the application of statistical theory to actual data. Topics include probability theory, estimation of parameters, and test of hypothesis for both the discrete and continuous case. This course is taken in the summer semester of the first year.

Directed Study (3 credits): This course is designed for students to conduct independent laboratory research under the direction of their research mentor *before* they complete their Advancement to Candidacy Milestone. This course is taken in the summer semester of the first year.

Summary of Course Requirements in the First Year:

Fall
Molecular Biophysics I: Structural Biophysics
Laboratory Research Rotation I
Foundations of Biomedical Science
Foundations of Biomedical Science Journal Club
MBSB Seminar

Spring
Molecular Biophysics II: Molecular Interactions and Dynamics
Molecular Biophysics III: Molecular Modeling & Computational Chemistry

Laboratory Research Rotations II and III
MBSB Seminar
Data and Literature Club

Summer
D2K: From Data to Knowledge-Biomedical Experimental Design and Analysis
Scientific Ethics and the Responsible Conduct of Research
Directed Study

Year II

Overview: Students are expected in their first year to select a research advisor after the end of the third rotation and begin their thesis research under the direction of the mentor they have selected. Students in their second year will focus on their research under the direction of their mentor, but will also complete the Comprehensive Examination.

Summary of Course Requirements in the Second Year:

Fall
MBSB Seminar
Data and Literature Club
Directed Study

Spring
MBSB Seminar
Data and Literature Club
Directed Study

Summer
Directed Study

MBSB Seminar and MBSB Data and Literature Club are each taken for 1 credit; Directed Study is taken for enough credits to bring the total number of credits to the minimum required for enrollment as a full time student (see below).

Elective Courses (Total of 6 credits): The courses taken here will be chosen on an individual basis based on the background and interests of the individual student. These courses are to be taken anytime between the beginning of the Fall Semester of the second year and the time the student completes their degree requirements for the PhD. The courses are intended to a) enhance student's background in biophysics theory and structural biology methodology, particularly in ways that will help students in the biophysical and structural aspects of their research projects and b) build knowledge in the student's area of specialization. Minimally one of the courses taken should be in the first of these areas. If a student lacks knowledge of computer programming, one of the elective courses should be a computer programming course, which MBSB would consider acceptable for satisfying a course in the first of these areas. Seminars or journal clubs are not acceptable for satisfying the requirement in either of these areas.

Elective courses should be chosen in consultation with the student's Dissertation Advisor and as appropriate also their Dissertation Supervising Committee and must be approved in writing by the MBSB Curriculum Committee (to request permission, please send Course Title, number of credits, course syllabus and a one paragraph justification to the MBSB Program Coordinator 6 weeks prior to the beginning of the term in which the elective course will be taken). Upon approval, elective courses can be taken at either the University of Pittsburgh (both the Dietrich School of Arts & Sciences and the School of Medicine) as well as Carnegie Mellon University.

Teaching Practicum Requirement (1 credit): Students are required once during their graduate student career to register for a Teaching Practicum course. Developing teaching skills is an important component of graduate education and the above course provides students with an opportunity to develop teaching skills.

Students will practice their teaching skills for the MBI or MBII courses. or they may choose to assist with another course; in the latter case, the student should seek permission from the Program Co-Directors (please send a short description of the course and a listing of the requirements for the course). To be eligible to complete the teaching practicum requirement, students must have successfully completed the MBI, II, III course series. MSTP students are exempt from this requirement.

Students may elect to get further experience in developing their teaching skills by serving as Course Support Assistants in graduate courses, such as the Foundations in Biomedical Sciences course. Those interested should contact their major advisor and program director.

Year III

Overview: Students are expected to form their dissertation committee, present their dissertation prospectus, advance to candidacy, and begin focusing on achieving the goals of their thesis research. Students will also continue to participate in Data/Literature Club and MBSB Seminar.

Fall
MBSB Seminar
Data and Literature Club
Directed Study

Spring
MBSB Seminar
Data and Literature Club
Research and Dissertation

Summer
Research and Dissertation

Research and Dissertation: This course is designed for students to conduct independent laboratory research under the direction of their research mentor *after* completing their Advancement to Candidacy Milestone.

MBSB Seminar and MBSB Data and Literature Club are each taken for 1 credit; Directed Study is taken for enough credits to bring the total number of credits to the *minimum* required for enrollment as a full time student (see below). Research and Dissertation is taken for a number of credits to bring the total to the *maximum* possible for enrollment as a full-time student (see below).

Year IV and beyond

Overview: Students are expected focus on achieving the goals of their thesis research, including publication of their results. Students will also continue to participate in Data/Literature Club (for a total of 7 semesters) and MBSB Seminar.

Fall
MBSB Seminar
Data and Literature Club (until taken for a total a seven semesters)
Research and Dissertation

Spring
MBSB Seminar
Data and Literature Club (until taken for a total a seven semesters)
Research and Dissertation

Summer
Research and Dissertation
Scientific Ethics and the Responsible Conduct of Research (Year 4)

MBSB Seminar, MBSB Data and Literature Club, and Scientific Ethics and the Responsible Conduct of Research (Year 4 only) are each taken for 1 credit; Research and Dissertation is taken for a number of credits to bring the total to the maximum possible for enrollment as a full-time student (see below).

Program Plan of Study

Students will declare their dissertation advisor in May of their first year after the conclusion of their three rotations. Students will begin working in his/her dissertation laboratory by June 1 of their first year and will continue doing so in the Fall semester of their second year and into their third year. Students are expected to establish the topic of their dissertation research and accumulate preliminary data supporting the feasibility of this project during this time. Students will take their comprehensive exam in the Spring/Summer semesters of the second year, and if successful, will proceed to form their dissertation supervising committee, present their dissertation prospectus, and complete their advancement to candidacy in the Fall semester of their third year. Hereafter, students will become full time researchers and will work to complete their dissertation under the direction of their research mentor; students' progress will be followed through dissertation committee, which will meet bi-annually to discuss the student's progress; a

PhD is awarded after successful defense of the dissertation, and all other degree requirements are met.

5. Advising and Academic Evaluation

Advising: You are assigned a first-year advisor/mentor upon admission to Molecular Biophysics and Structural Biology Graduate Program. Your first-year advisor/mentor will help you identify individuals who can provide specialized advice on research rotations, advise you of the various milestones that are part of the Molecular Biophysics and Structural Biology Graduate Program, assist you in decisions regarding second and third term classes, and sign all your enrollment forms until you formally transfer to your advisor's lab.

Academic Evaluations: Student academic evaluations are required for PhD students and must occur annually.

The Preliminary Examination will be conducted either at the end of the spring term or during the summer to review the first-year students' performance in courses as well as written evaluations by the faculty members involved in the laboratory rotations. See Research Rotations for more details.

Annual Academic Assessments for students in their second and subsequent years will be conducted at the end of the spring term or during the summer to assess their performance in courses, thesis committee reports, as well as through written assessments by their faculty mentors. One of three decisions will be made for each student after the annual academic assessments:

- The student may be advanced to the following academic year in good standing
- The student may be conditionally advanced; they would then be directed to specific courses or other requirements that would address the committee's concerns
- The student may be placed on probation for a specified period, and if the conditions of the probation are not satisfied, dismissed from the program for poor academic performance.

Thesis Committee Meetings are mandatory once per year, or more frequently if requested by the student's supervising committee. At these meetings, the students will present their progress and receive feedback from their thesis advisory committees. Students whose performance is not satisfactory could be placed on academic probation for a defined period with guidance on how to return to good academic standing.

To accommodate both University and Program requirements, the committee make-up should be as follows: The committee should consist of four or more members including his/her dissertation advisor. If the student is affiliated with Pitt's School of Medicine, the majority of the committee (including the major advisor) must have Graduate Faculty Status. Also for School of Medicine students, the same faculty member cannot act as the advisor and dissertation committee chair. If the student is affiliated with Pitt's Dietrich School of Arts & Sciences, all committee members must have Graduate Faculty Status,

and all of the committee members cannot be from the same department. Whether the student's home University is Pitt or CMU, the majority of the committee must be a member of the MBSB Graduate Program Training Faculty. One member of the committee must be from outside of the MBSB Graduate Program Training Faculty at either Pitt or CMU. Special requests to have a member outside of the Pitt or CMU faculty may be granted upon request. If the chair is not the same as the major advisor AND the student's home school is CMU, the Chair must be a regular faculty member with the rank of Assistant Professor or higher. One of the responsibilities of the student advising committee is to assess when the student has made satisfactory progress in their research such that they can begin to write their thesis and set a tentative date for the defense.

Student Worker Evaluation for Graduate Student Researchers (GSRs): In addition to the annual academic assessment conducted by the MBSB Graduate Program, there will also be an annual evaluation of student workers.

Registration – The Molecular Biophysics and Structural Biology Graduate program will register their students for their first fall term's coursework. After their first term, in consultation with their advisors/mentors, students will complete an Enrollment Form with their signature along with their advisors' signature and submit it to their Program Coordinator. The Program Coordinator will remove the advising hold placed by the Office of the University Registrar each term and register the students for the classes indicated on their Enrollment Forms. Students are required to be registered for each term by the designated registration deadline.

Full-time registration requires between 9-15 credits in the fall and spring terms. PhD students are required to register for a minimum of 3 credits in the summer term, and can take up to 9 credits

6. Milestones

The MBSB Program tracks your progress toward the degree by means of a series of Graduate Milestones. Successfully completing each milestone is a requirement of the MBSB Program and the University in which you are enrolled for the PhD degree.

The Preliminary Examination – The Oversight & Evaluations Committee will meet at the end of the Spring Term to evaluate the progress of the first year students. This evaluation will include a review of performance in courses as well as written evaluations by the faculty members involved in the laboratory rotations. Successful completion of preliminary examination requires that the student must have identified a laboratory for their dissertation research. Inability to do so could result in dismissal from the graduate program and hence the University of Pittsburgh. The Program Co-Directors must sign the Preliminary Examination milestone form.

The Comprehensive Examination - The Comprehensive Examination is the major requirement that a student must pass before being admitted to candidacy for the doctoral degree. Students are required to complete the Comprehensive Exam by May 31 of their second year in the graduate program. Any requests for a delay in this schedule must be made in writing to the Co-Directors of the Graduate Program; such requests should include a reason for the delay, as well as the time when the student proposes to take the exam.

This exam provides the student with an opportunity to master the literature in their own area of research and ultimately to demonstrate that the needed competency has been achieved. The format of the exam is also designed to provide training in the preparation and defense of research proposals, both orally and in written form. The specific educational goals of the Comprehensive Exam are to test the student's ability to:

- independently evaluate and critique a body of literature,
- integrate the acquired information into broad conceptual schemes,
- develop testable hypotheses,
- devise experimental approaches and thereby evaluate hypotheses,
- demonstrate the communication skills required to present and defend scientific ideas in oral and written formats.

The topic of the Comprehensive examination is expected to overlap with the student's research interests and general dissertation goals. However, it is expected that the proposed plan be original in its conception and scholarly in its execution. This means that the research proposal submitted for the comprehensive examination must be demonstrably different from proposals in any form (i.e. written, orally presented, or informally discussed) that the student has received from his/her faculty advisor, other members of his/her research laboratory, or other sources. This also means that the faculty advisor may not be involved in any stage of the process, from project conceptualization to writing and critiquing the proposal.

Committee: Students will be contacted by the third week of February of their second year and asked to submit to the Oversight and Evaluations Committee a brief description of two research topics (approximately one page each with a brief summary of the research problem and listing of Specific Aims) from which they would like their exam topic to be chosen. The proposed topics should reflect an informed analysis of the relevant literature and should be supported by essential citations and should be submitted to the Oversight and Evaluations Committee no more than 4 weeks after the initial request. The committee will then pick the research topic on which the student will be examined, with the committee selecting from one of the two topics the student has provided, or a modification of one of these areas. The committee will ensure that the specific topics chosen for study do not substantively overlap with any proposals that his/her faculty advisor or other members of his/her research laboratory: 1) is currently preparing, 2) has already prepared and submitted for review, or 3) has been submitted and been funded (or submitted and currently undergoing revision) by contacting the student's faculty advisor at both the abstract and full written proposal stages. In this regard the goal for the student is to develop expertise in the relevant literature, technical approaches, and experimental design without relying on his/her faculty advisor or other members of his/her research laboratory.

The Evaluation committee will then select a Comprehensive Exam committee, including a chairperson. This committee will contain three members of the MBSB graduate training faculty. The research advisor cannot serve on the committee. The student is encouraged to interact with the committee to ensure that the specific aims page is appropriately written such that the student is likely to be successful in developing the proposal. The advisor is not required to be a member of the student's comprehensive examination committee, but a majority of the committee members must have graduate faculty status at the University of Pittsburgh. A mentor, if included on the committee, must be a non-voting member.

Written Exam: After receiving the specific research topic and the membership of their examining committee, students have four weeks to write a research proposal in the style of an NIH F30 or F31 research training plan based on this topic. Thus, students will need to evaluate the literature in the selected area, identify gaps in knowledge, formulate significant and relevant hypotheses, and devise experimental strategies to test their hypotheses. The written proposal should follow the basic form of an NIH F30 or F31 research training plan and should be a realistic proposal for 3 years of research for a student enrolled in a PhD granting graduate program. The proposal should only include the **Specific Aims and Research Strategy** sections of an NIH F30 or F31 proposal. The **Specific Aims** section (**maximum of 1 page)** should include a statement of the hypotheses to be tested and the goal or objectives of the proposal. The **Research Strategy** section (**maximum of 6 pages**) should include i) **Significance** (ca. 1-1/2 pages) and ii) **Approach** (ca. 4-1/2 pages). Unlike the NIH requirements, the **Research Strategy** section should exclude an Innovation component and should instead focus on articulating the scientific problem and the underlying premise on which it is based as part of the **Significance** section; it should also focus on the methods and experiments that are proposed to achieve the research goals of the proposal as part of the **Approach** section. The **Approach** section should place less emphasis on methodological details and more emphasis on the rationale and experimental design, anticipated outcomes, and potential experimental pitfalls. This section should accommodate unexpected findings and alternative strategies should be articulated. **Preliminary Studies**, which are also part of the **Approach** section, should include a brief description of the types of preliminary data the

student feels are necessary to support the proposal. **Literature Cited:** Full citations of all referenced literature should be included (there is no page limit for this section). For details of the F30 or F31 application format, margins and font requirements, see instructions for preparing an NIH grant application on the NIH web site. Students are encouraged to look at actual NIH F30 or F31 grant applications submitted by other students who have successfully received a fellowship to get a sense of what is included in an application.

The Chair of the O&E committee (or a representative) of the MBSB Graduate Program will meet with all the students taking the comprehensive examination to discuss the ground rules for the exam and will answer any questions about the exam that the students may have. Students may seek feedback from their committee on their Specific Aims. While working on the written portion of the Exam, it is appropriate for students to discuss their ideas with their Committee members as well as with other faculty and students. However, (1) such interactions should be restricted to seeking information on the strengths and weaknesses of experimental approaches, (2) students are not allowed to receive assistance with written drafts of their Exam or guidance in the construction of the proposal from their faculty advisors, other members of their laboratory, or other faculty, and (3) students are free to allow other graduate students and postdocs outside of their laboratory read and critique their documents. A critical aspect of the Committee's evaluation will be on the scientific writing of the proposal.

Oral Exam: Within one week after submission of the written proposal, the student's committee will decide whether the student has passed or failed the written portion of the examination. A failure in the written part will constitute one failure in the full comprehensive examination. If the student's written proposal is considered acceptable, there will be an oral examination as soon as possible (within 1-2 weeks after passing the written examination). The oral exam consists of a brief (~15 min) presentation of the proposal to the student's Evaluation Committee followed by an oral exam (~ 2 hr total). At the oral examination students will be expected to defend their hypotheses and to address questions concerning all background information relevant to the topic, significance, and design of the experiments they have proposed. Students should expect that their examination may encompass the breadth of molecular biophysics and structural biology as related to the proposal and/or topics covered in their required courses. Students should be able to explain the basis of all techniques proposed as well as the appropriate controls. Students are strongly encouraged to schedule a "mock oral exam" with other graduate students (but not students, postdocs or others from their host laboratory) prior to the exam with the Committee.

Evaluation: At the end of the oral exam, the student will be excused from the room and the committee will evaluate the student's performance. The student will then be immediately informed of the decision of the committee. The possible outcomes are pass or fail. If the student fails the oral examination, he/she will be allowed to retake the oral exam provided they are not already on probation. The student may also be asked to revise his/her written proposal based on the comments/criticisms of the committee.

The second exam must occur within 1 month of the initial exam. The second exam committee will consist of at least one original committee member and up to two new members, selected by the Oversight & Evaluations Committee. The exam must be passed before a student

can apply for admission to candidacy for the Ph.D. Once this examination has been passed, the program notifies the appropriate Dean of Graduate Studies of that fact.

Nomination of a Doctoral Dissertation Advisory and Final Examination Committee - After the student passes their comprehensive examination, the student and their major advisor(s) will select the dissertation committee members. The dissertation committee must be approved by the Program Co-Directors prior to seeking approval from the Associate Dean for Graduate Studies. A majority of the dissertation committee members must have graduate faculty status to meet the SOM requirement. Only upon these approvals may the student convene an Overview/Prospectus meeting and then petition for Admission to Candidacy.

Dissertation Overview/Prospectus Meeting – The student's dissertation advisory committee, pending approval of the Associate Dean for Graduate Studies, meets and approves the dissertation proposal at this meeting.

Application for Admission to Candidacy for the Doctoral Degree – This is the formal petition from a student permitting them to study toward the PhD degree. It must be approved by the Associate Dean for Graduate Studies.

Dissertation Defense Report – When the dissertation work and written thesis are completed, a public defense is held. The Dissertation Defense Report is signed and submitted to the Graduate Studies Office following the defense.

Dissertation Approval Report – The Dissertation Approval Report is signed by the student's dissertation committee and submitted to the Graduate Studies Office upon completion and approval of all revisions.

7. Requirements for the Ph. D. Degree

Summary of the Requirements for the Ph.D.

Year I:

- Successful completion of required courses
- Successful completion of three laboratory rotations
- Successful Completion of the Preliminary Exam Milestone (end of Spring semester)
- Selection of a Research Advisor
- Active participation in MBSB Seminar
- Active participation in Data & Literature Club (Spring Semester)

Year II:

- Successful completion of the Comprehensive Examination Milestone (Summer semester, Year 2)
- Satisfactory progress in dissertation research
- Active participation in MBSB Seminar and Data & Literature Club
- A favorable Second Year Evaluation
- Advanced courses (can begin, if desired)

Year III through graduation

- Active participation in MBSB Seminar
- Active participation in Data and Literature until the requirement of 7 semesters has been met
- Successful completion of advanced elective courses (6 credits total required before graduation)
- Nomination of Dissertation Advisory Committee Milestone (Fall semester, Year 3)
- Dissertation Prospectus Milestone (Fall semester, Year 3)
- Admission to Candidacy Milestone (Fall semester, Year 3)
- Satisfactory progress in dissertation, with committee meetings once every year
- Favorable Evaluations by the O & E Committee
- Writing and successful defense of a Ph. D. Dissertation
- Dissertation Defense Report Milestone
- Dissertation Approval Report Milestone

Credit Requirements for the Ph.D.

The minimum credit requirement for the PhD degree is met by six terms of registration as a graduate student for 12 or more credits per term or the equivalent number of credits in a reduced load. A minimum of 32 course credits and 40 dissertation credits are required to earn a PhD degree.

No more than 30 credits may be accepted for a master's degree awarded by another institution to meet the minimum credit requirement. In recognition of graduate study beyond the master's degree successfully completed elsewhere, no more than 12 additional credits may be accepted at the time of admission to meet the minimum credit requirement.

Graduate students already enrolled may, when approved in advance by their graduate program and the dean, spend a term or more at another graduate institution to obtain training or experience not available at the University of Pittsburgh and transfer those credits toward the requirements for an advanced degree at the University of Pittsburgh. In all cases, at least three terms, or 36 credits, of full-time doctoral study must be successfully completed at the University of Pittsburgh.

Students must register each term for the number of credits for course work, independent study, or research equivalent to the anticipated use of faculty time and University facilities. A student who has not registered for at least one credit during a 12-month period will be transferred automatically to inactive status and must file an application for readmission to graduate study (and pay the application fee) before being permitted to register again.

8. Academic Appointments for PhD Students

MBSB Students in the University of Pittsburgh School of Medicine and Dietrich School of Arts and Sciences:

PhD students in the University of Pittsburgh School of Medicine and Dietrich School of Arts and Sciences receive academic appointments that provide stipend support, tuition remission, and health insurance. First year PhD students receive Dean's fellowships through academic appointments as Predoctoral Fellows (Certificate Fellows) – Predoctoral Fellows and Trainees Policy. These fellowships are awarded to support entering first-year students before they choose a dissertation advisor. To retain the award, students must maintain a minimum cumulative grade point average of 3.00 while taking a full-time course load (9-15 credits in the fall and spring terms; at least 3 credits in the summer term).
In the second year and beyond, PhD students in the School of Medicine and Dietrich School of Arts and Sciences are supported through academic appointments as:

- Graduate Student Researchers (GSRs) are generally funded through research grants to faculty members. Graduate Student Researchers (GSR) Academic Regulations
- Trainees are generally funded through NIH training grants (e.g. T32) Predoctoral Fellows and Trainees Policy
- Predoctoral Fellows are generally funded through NIH predoctoral fellowships (e.g. F30, F31) Predoctoral Fellows and Trainees Policy

It is a University of Pittsburgh School of Medicine and Molecular Biophysics and Structural Biology Program policy that all PhD students receive the same stipend, regardless of their educational background or program of study. The only exceptions are competitive individual fellowships that pay higher stipends. Awards with a stipend that is less than the school stipend must be supplemented to the full school level.

Termination of an Academic Appointment – Academic appointments can be terminated if students are not meeting the standards specified according to the School in which they are enrolled (see https://www.gradstudies.pitt.edu/funding/appointments).

MBSB Students in the Carnegie Mellon University Mellon College of Science:

PhD students in the Mellon College of Science receive stipend support, tuition remission and coverage of the individual annual premium for the University's Student Health Insurance Program (SHIP). The terms, requirements and policies related to this support is covered in the student's departmental handbook (see Section 2 where links to these resources are provided).

9. Medical Scientist Training Program (MSTP)

An MSTP student (Medical Scientist Training Program – see https://www.mdphd.pitt.edu/) who wishes to conduct graduate studies in *the Molecular Biophysics and Structural Biology Graduate Program* should identify potential research laboratories and meet with respective PIs. The

student should also forward all transcripts (undergraduate and graduate), CV, statement of research interest, and three letters of recommendation to the Program Co-Directors, who will send the request to the Admissions committee(s) for evaluation.

Program requirements specific for MSTP students (MD/PhD) factor into the MSTP students' advanced training outside of our program. These students are typically considered advanced students and rotation and course requirements for the program are modified as follows:

- (7c) A single "conditional" lab rotation is possible, rather than the three typically required, although more may be needed if a suitable lab is not identified. Given the time constraints of their schedules, this will allow MSTP students to start research sooner, provided the first rotation leads to a mutually agreeable situation.
- (7d) MSTP students are exempt from the normal teaching practicum requirement.
- (7e) MBSB MSTP students are expected to take the *Introduction to Statistical Methods 1* summer course but are exempt from the *Scientific Ethics* summer course offered by MBSB. Instead, they will attend the ethics course offered by the MSTP program (MSTP 5983).

It is intended that these modifications to the standard program will permit fulfillment of *the Molecular Biophysics and Structural Biology Graduate Program* PhD requirements within four years, although longer studies may be needed for completion of the thesis research.

10. Terminal Master's Degree

Students are not admitted to the Molecular Biophysics & Structural Biology Program to pursue an M.S. degree, but it might become necessary for a Ph.D. student to transfer to an M.S. track for a variety of reasons. They could include factors beyond the student's control, *e.g.,* medical circumstances or a change in family circumstances necessitating a long-distance move. They could also include academic factors such as an unsatisfactory performance in the Ph.D. Comprehensive Examination. In any of these, or similar circumstances, a student may petition to be transferred to a terminal Master's program. The petition must be addressed in writing to the program Co-Directors and must have the support of the laboratory advisor.

The requirement for passing an M.S. comprehensive examination is met by an oral exam based on a brief (approximately two page) proposal for the Master's dissertation research. The student's Dissertation Committee will administer this examination. The scope of the Master's research proposal should be appropriate for a Master's dissertation and therefore less than for a Ph.D. dissertation. For students who transfer to the M.S. track after attempting the Ph.D. comprehensive examination, the examining committee has the option of deciding that the Ph. D. examination meets the requirement for an M.S. comprehensive examination. Masters students must submit and defend a thesis and comply with all applicable University requirements for the Master of Science degree.