UCONN HEALTH

Graduate Program in Molecular Biology and Biochemistry
Student Handbook
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Introduction

Welcome to the graduate program in Biomedical Sciences at UConn Health. This handbook is intended to inform you about the requirements and policies of the Molecular Biology and Biochemistry (MBB) Area of Concentration (AoC). This AoC is based in the Department of Molecular Biology and Biophysics and also includes numerous faculty from other departments within UConn Health. This handbook contains essential information about deadlines which you will have to heed as you progress through your graduate career. Consequently, please plan to consult this handbook at regular intervals. If you have questions, please contact a program director. Additional information and policies are available in the UCONN graduate school catalog.
Program Directors

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Financial Matters

Financial Support

At present, the financial support package includes: a) full payment of tuition and fees; b) a stipend of $30,500; c) health insurance. There are no teaching responsibilities associated with the stipend. Stipend payments are distributed biweekly. It is important to recognize that graduate study is considered a full-time endeavor and other employment or educational activities need to be approved by the advisor and thesis committee.

Academic Matters

The primary goal of the program is to educate students for a broad range of careers in the biology of the coming decades. Whether the graduate enters academic research, the biotechnology industry, a liberal arts teaching college or patent law, we expect that they will bring to that career a solid base of knowledge, an ability to learn and think independently and an enduring desire to use their full range of professional skills and experience in creative ways. We expect our graduates to have demonstrated a high degree of competence in research, as judged by publications in high quality peer-reviewed journals, and to have developed essential skills in identifying important research problems, planning research projects and scientific writing. We also expect our students to have incorporated ethical principles of scientific conduct into their professional activities and to be sensitive to such issues throughout their careers.

In addition, to earning the PhD degree, it is also possible for students to enroll in other degree-granting programs within the university (such as the UConn Business School MBA program) contemporaneously. This requires the approval of the student’s advisor, the thesis advisory committee and the Associate Dean of the Graduate School (UConn Health Campus).

All the necessary forms for the General Exam, Dissertation, Plan of Study, etc are available on-line at the UConn Current Students directory and UConn Health Biomedical Science Ph.D. Program Milestones. It should be noted that all official paperwork should be filed through Registrar’s Office on the UConn Health campus, regardless of the address on the forms.

Thesis Research Laboratory

Typically a student will perform three (3) rotations in the first year. This is to allow them the opportunity to try a variety of research projects, environments and mentors. After performing laboratory rotations, the student will pick a laboratory in which to perform
their thesis research. This will be done in consultation with the proposed mentor. A student may petition to the Graduate Programs Committee to waive the requirement for the third rotation. Upon selection of a thesis laboratory, a Change of Major Advisor form must be completed.

**Thesis Committee**

The student’s thesis committee will oversee the research. The committee consists of the major advisor plus at least three (3) additional members of the faculty who should be picked by the student in consultation with the major advisor. The committee should be formed by **December of the 2nd year**, if not earlier. It is important to inform Bridget Clancy-Tenan when this is done. The Plan of Study should be filed at the same time.

It is expected that this committee will meet a minimum of once per year (under certain circumstances more frequent meetings may be necessary) and will also discuss progress with the student following the presentation of their annual work-in-progress talk (see below).

**Preliminary (General) Exam**

The examination consists of two parts: a written proposal and an oral defense. Students will present a work-in-progress talk in January/February of the second year so they can have a meeting with their thesis committee prior to the preliminary exam. The deadline for this pre-meeting is **March 28th**. Students should prepare a draft outline/specific aims page so that they can discuss it with their committee at this meeting. Based on this, a final specific aims page must be approved by the committee by **April 15th**. Students will prepare the written portion of the exam (see below for details) and provide it to their exam committee (see below) four weeks after the date of approval of their Specific Aims. The examination can be arranged two weeks after the completion of the written portion but must be completed by **May 31st** of the second year. The exam committee will consist of the advisor, three other members of the thesis committee plus one other, therefore must be at least five members. One member of the committee must be either the director, associate director or assistant director of the MBB program who will chair the meeting. The major advisor remains silent during the examination unless specifically requested to clarify an issue by the chair.

At the start of the meeting, the student will be asked to excuse themselves while the committee discusses the written proposal and identifies any deficiencies to the chair. The student will then return when requested and proceed with their presentation. At the General Exam meeting, the members of the General Exam Committee will have the opportunity to ask questions as the presentation proceeds. The discussion may focus on the theory behind the proposal, the methods used to address the problem, the
interpretation of preliminary data and alternative approaches to the experimental problem.

The student will then be asked to leave the room, and the General Exam Committee will evaluate: 1) the written proposal, 2) the student's performance during the oral defense, and 3) the student's prior performance in the program (course work, rotations, etc.; the MBB Director or Associate Director will be responsible for providing the student's records). All members of the examination committee will participate in this discussion and recommend an outcome for the exam. The exam committee must be unanimous in their decision. The committee will choose among the following outcomes:

- Unconditional pass.
- Pass with specific remediation.
- A satisfactory rewrite of all or part of the proposal as a condition to passing the exam.
- A satisfactory retake of the oral defense as a condition to passing the exam.
- Retake of the entire exam.
- Fail.

The student will be immediately informed of the committee's decision by the major advisor and the Program Director. The Report on the General Examination for the Doctoral Degree form should be submitted to the Office of the Registrar IMMEDIATELY following the final decision of the examination. The report must be submitted whether the final examination has been passed or failed. The student is responsible for preparing the report and collecting the signatures from your committee members, but not submitting the report. The original report should be submitted to the Office of the Register by a faculty member, which can be your major advisor or the director of the MBB program. A copy of the report is to be retained by the major advisor. This report must be submitted within thirty days of the examination for you to be eligible for retroactive Graduate Assistantship pay. The student should also inform Bridget Clancy-Tenan in the MBB Departmental office to update the student record.

Format for the Written Research Proposal and Other Details

The General Exam will consist of a research proposal based on the student’s work in their major advisor’s lab and an oral defense of the proposal. The proposal should be prepared using the new NIH grant format (Arial, 11 point). The proposal will be limited to a total of 12 pages and consists of Project Summary (limited to 30 lines of text and should be able to stand on its own), a one-page Specific Aims statement and a 10-page Research Proposal with the following sections:
Significance
Innovation
Approach (Includes Experimental Design and Preliminary Results)
Cited Literature (not counted as part of the 12 pages)

The following is from the new NIH guidelines:

Specific Aims. (One page)

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Research Strategy. (12 pages)

Organize the Research Strategy in the specified order and using the instructions provided below. Start each section with the appropriate section heading – Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section (References are not part of the 12 page limit).

(a) Significance
• Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
• Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
• Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

(b) Innovation
• Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
• Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.
• Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

(c) Approach
• Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted.
• Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
• Describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work.
• Include information on Preliminary Studies as part of the Approach section. Discuss preliminary
Bibliography & References Cited (not included in the 12 part limit): Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal.

In preparing the proposal, the student may consult any faculty member, including the thesis advisor, and other sources, regarding experimental methods and approaches. However, the student is solely responsible for the written proposal; the major advisor and committee members are not allowed to read or critique the written proposal during the preparation period. Copies (PDF files only) of the finished proposal must be emailed to the General Exam Committee at least two (2) weeks prior to the scheduled exam date. After submitting the written proposal, the student is allowed to prepare and practice his/her oral presentation with fellow graduate students, but not the major advisor or any other faculty member within or outside the MBB department. On the exam date, the student will present their proposal to the exam committee. Typically students use PowerPoint, but other more direct media are also encouraged.

**Thesis Prospectus (Dissertation Proposal)**

The Dissertation Proposal form is a requirement of the University of Connecticut graduate school and must be submitted through the Registrar's Office on the UConn Health campus at least 6 months prior to the expected degree completion date. To ensure that this requirement is met in a timely manner, the MBB program requires that this form be submitted to Storrs by the beginning of the third year (August 31st). It is most common and expeditious for a student to rework their general exam proposal to fit the required format. It is essential to inform Bridget Clancy-Tenan when this form has been filed.

**Work In Progress Talks**
All students in their second year and beyond are required to present their research work-in-progress to the program. This talk will be in the form of a chalk-talk combined with a limited number of slides to show experimental data only (preferably 5-7 slides maximum). Students who are likely one year or less from graduating (as determined by student and mentor) will no longer perform a chalk-talk, but rather present a formal seminar with slides.

**MBB Journal Club**

All students in all years are required to attend the weekly MBB Journal Club. Students will be required to present at least once per year. Attendance and active participation at all journal club sessions is expected.

**Thesis Preparation and Defense**

The thesis and its defense is an essential step to earning the PhD degree. The written thesis should provide a detailed exposition of the student’s research work and include both an introduction that places the work in perspective and a concluding section which highlights the impact of the student’s research and identifies future avenues that could be explored. The thesis will be prepared by the student in consultation with their mentor and other faculty as appropriate after the advisory committee has decided that the student is ready to defend. It is important to note that there are strict formatting requirements for the dissertation which must be adhered to.

The defense of the thesis takes place in two presentations: 1) a private defense before members of the exam committee and 2) a public defense open to all. Once the thesis is submitted to the exam committee, a **minimum of two weeks** must be allowed before the private defense is held. Once the thesis is defended successfully at the private defense, the [Doctor of Philosophy Dissertation Tentative Approval form](#) and an approved DRAFT of the thesis must be submitted electronically. This must be done at **least 2 weeks prior** to the public defense. This requirement is to provide a minimum time in which alterations to either the thesis content or the presentation can be made. At least five (5) members of the graduate faculty (including a program director) **must** be present at the public defense. It is important to note that even though a student may pass the private defense, they can still be in jeopardy if they do not perform well at the public defense. Upon successful completion of the public defense, the [Report on the Final Examination](#) must be submitted and an application for graduation must be completed on
PeopleSoft. The student is still permitted to make additional edits to the draft thesis before final submission. For students on a visa, the final thesis must be submitted within three weeks of the public defense.

**Recommended Coursework**

Apart from attendance at journal club and the course on the *Responsible Conduct of Science* that is mandatory for all students, the MBB program does not have a specific list of courses that are required to be taken during the first two years. Rather, MBB students take a variety of didactic coursework that is dependent on their interests and background, and is chosen in consultation with their first year advisors and/or research mentors. Our students commonly select from the following list, although many other courses are offered within UCONN HEALTH and can be taken for credit by interested students. The MBB program does strongly encourage students to register for both *Foundations of Biomedical Science* and *Molecular Basis of Disease* courses (although not necessarily in the same semester) as these focus specifically on the molecular underpinnings of biomedical science.

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<tr>
<td>MEDS 6496</td>
<td>Laboratory Rotation</td>
</tr>
<tr>
<td>GRAD 6950</td>
<td>Continuing registration for doctoral students after obtaining a thesis advisor and turning in Change of Major Advisor form.</td>
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<tr>
<td>MEDS 6497</td>
<td>Molecular Biology and Biochemistry Journal Club</td>
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<tr>
<td>MEDS 6448</td>
<td>Foundations of Biomedical Science (4 credits)</td>
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<td>MEDS 5418</td>
<td>Stem Cells and Regenerative Biology (3 credits)</td>
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<tr>
<td>MEDS 6450</td>
<td>Optical Microscopy and Bio-Imaging (3 credits)</td>
</tr>
<tr>
<td>MEDS 5309</td>
<td>Molecular Basis of Disease (2 credits)</td>
</tr>
<tr>
<td>MEDS 5380</td>
<td>Eukaryotic Cell Biology (4 credits)</td>
</tr>
<tr>
<td>MEDS 5369</td>
<td>Advanced Genetics and Molecular Biology (3 credits)</td>
</tr>
<tr>
<td>MEDS 5351</td>
<td>Biochemistry II (3 credits)</td>
</tr>
<tr>
<td>MEDS 6444</td>
<td>Medical Microbiology (3 credits)</td>
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<tr>
<td>MEDS 413</td>
<td>Introduction to Cancer Biology (2 credits)</td>
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MEDS 5310  Responsible Conduct in Research (1 credit; Attendance is Mandatory)

MBB Program Faculty Contact Information and Research Interests

Irina Bezsonova, Assistant Professor of Molecular Biology and Biophysics, B.S. Lomonosov Moscow State University, Ph.D., University of Toronto. (Room E2032, Tel: 860 679 2769, Email: bezsonova@uchc.edu). Protein structure-function relationship, NMR spectroscopy, X-ray crystallography, protein folding, epigenetics.
Gordon G. Carmichael, Professor of Genetics and Developmental Biology, B.S., Duke University, Ph.D., Harvard University (400 FARM Room 1602, Tel: 860-679-2259, Email: carmichael@uchc.edu). Regulation of viral gene expression and function.

John H. Carson, Professor of Molecular Biology and Biophysics, B.A., Reed College, Ph.D., Massachusetts Institute of Technology (400 FARM Room 1431, Tel: 860-679-2130, Email: jcarson@uchc.edu). RNA transport in cells of the nervous system.

Ann E. Cowan, Professor of Molecular Biology and Biophysics, Deputy Director, Center for Biomedical Imaging Technology; B.Sc., Queen's University, M.S., Yale University, Ph.D., University of Colorado (400 FARM Room 1602, Tel: 860-679-1449, Email: acowan@uchc.edu). Plasma membrane proteins in sperm.

Asis K. Das, Professor of Molecular Biology and Biophysics, B.Sc., M.Sc., Ph.D. University of Calcutta (Room L2017, Tel: 860-679-3405, Email: adas@uchc.edu). Regulation of gene expression; bacterial adaptive response and pathogenesis.

Kimberly Dodge-Kafka, Associate Professor of Cell Biology/Center for Cardiology and Cardiovascular Research; B.S. Texas A&M University, Ph.D., University of Texas Health Science Center-Houston (Room EG029, Tel: 860-679-2452, Email: dodge@uchc.edu). Molecular mechanism of signaling pathways in the heart.

Betty Eipper, Professor of Molecular Biology and Biophysics and Neuroscience, B.S., M.S., Brown University, Ph.D., Harvard University (Room E4041, Tel: 860-679-8898, Email: eipper@uchc.edu). Biosynthesis and secretion of peptides by neurons and endocrine cells.

Michael Gryk, Associate Professor of Molecular Biology and Biophysics, B.S., M.S., University of Connecticut, Ph.D., Stanford University (Room L2051, Tel: 860-679-4785, Email: gryk@uchc.edu). Three dimensional structure and function of proteins involved in DNA repair.

Bing Hao, Associate Professor of Molecular Biology and Biophysics, Ph.D., Ohio State University (Room L2005, Tel: 860-679-8364, Email: bhao@uchc.edu). Understanding how the cell cycle is regulated by ubiquitin-mediated proteolysis using x-ray crystallography as a primary tool.

Christopher Heinen, Associate Professor of Medicine, B.Sc., Northwestern University, Ph.D., University of Cincinnati (Room E1032, Tel: 860-679-8859, Email: cheinen@uchc.edu). Biochemical and cellular defects of the DNA mismatch repair pathway during tumorigenesis.

Jeffrey Hoch, Professor of Molecular Biology and Biophysics, Director of Gregory P. Mullen NMR Structural Biology Facility; Ph.D., Harvard (Room L2007, Tel: 860-679-3566, Email: hoch@uchc.edu). Biophysical chemistry of proteins.
Stephen M. King, Professor of Molecular Biology and Biophysics, B.Sc., University of Kent, Ph.D., University College London (Room L2001, Tel: 860-679-3347, Email: sking@uchc.edu). Structure and function of microtubule-based molecular motor proteins; cilia and flagella. King Lab Web Page

Lawrence A. Klobutcher, Professor of Molecular Biology and Biophysics, B.S., Loyola University (Chicago), Ph.D., Yale University (Room L1071, Tel: 860-679-2816, Email: klobutcher@uchc.edu). DNA rearrangement in eukaryotic cells, phagocytosis.

Dmitry Korzhnev, Assistant Professor of Molecular Biology and Biophysics, B.S., Ph.D., Moscow Institute of Physics and Technology. (Room E2035, Tel: 860 679 2849, Email: korzniev@uchc.edu). Folding and conformational dynamics of proteins using NMR spectroscopy.

Mark Maciejewski, Assistant Professor of Molecular Biology and Biophysics, Ph.D., Ohio State University (Room L2021, Tel: 860-679-1943, Email: markm@uchc.edu). Utilizing NMR to characterize the three-dimensional structure, function and dynamics of proteins from a wide range of important biological systems.

Mary Jane Osborn, Professor Emeritus of Molecular Biology and Biophysics, B.A., University of California, Berkeley, Ph.D., University of Washington (Seattle) (Room L2046, Tel: 860-679-4206, Email: osborn@uchc.edu). Biogenesis of the outer membrane of Salmonella.

Justin D. Radolf, Professor of Medicine, B.S., Yale University, M.D., University of California San Francisco (Room E2018, Tel: 860-679-8480, Email: jradolf@uchc.edu). Molecular pathogenesis and immunobiology of spirochetal infections.

Lawrence I. Rothfield, Professor Emeritus of Molecular Biology and Biophysics, A.B., Cornell University, M.D., New York University (Room L2046, Tel: 860-679-3581, Email: lroth@uchc.edu). Cell and molecular biological studies of bacterial cell division and the bacterial cytoskeleton.

Adam Schuyler, Assistant Professor of Molecular Biology and Biophysics. B.S., Williams College, Ph.D., Johns Hopkins University (Room L2019, Tel: 860-679-1496, Email: schuyler@uchc.edu) Computational modeling; allosteric activation; optimizing multidimensional NMR.

Peter Setlow, Professor of Molecular Biology and Biophysics, B.A., Swarthmore College, Ph.D., Brandeis University (Room L2003, Tel: 860-679-2607, Email: setlow@uchc.edu). Biochemistry of bacterial spore germination.

Suzy V. Torti, Professor of Molecular Biology and Biophysics, B.A., Reed College, Ph.D., Tufts University (Room EM032, Tel: 860-679-6503, Email: storti@uchc.edu). Iron regulation and tumorigenesis.
Sandra K. Weller, Professor and Chair of Molecular Biology and Biophysics, B.S., Stanford University, Ph.D., University of Wisconsin (Room E2056, Tel: 860-679-2310, Email: weller@uchc.edu). Molecular genetics and biochemistry of herpes simplex virus DNA replication.