The Michigan Chemistry-Biology Interface Training Program

General Information
And
Guidelines

A Handbook for Trainees
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The Michigan Chemistry-Biology Interface Training Program
General Information and Guidelines for Students
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1. Program Overview
The Chemistry Biology Interface (CBI) Training Program is a unique multidisciplinary Ph.D. training program that focuses on the fundamental underlying chemical principles that govern all biological processes. This dynamic program help students obtain expertise in disciplines related to, but traditionally outside of the student’s normal academic and research experience. All students will experience intensive laboratory research training with the aim of fostering the development of the students into independent, innovative scientists in academic or industrial settings.

Research opportunities for the trainees are varied and involve faculty with a wide range of expertise in research at the interface of chemistry and biology. The trainees have access to the most sophisticated techniques and instrumentation in modern research at this interface. Distinguished faculty members from the Department of Chemistry (College of Literature, Science, and the Arts), the Departments of Biological Chemistry and Pharmacology (Medical School), the Biophysics Research Division (BRD), the Department of Pathology (Medical School) and the Department of Medicinal Chemistry (College of Pharmacy) and the interdepartmental program in Chemical Biology (Rackham Graduate School) have combined strengths to create this challenging new program. The Doctorate of Philosophy Degree, PhD., will be awarded in the departments of Chemistry, Biological Chemistry, Pharmacology, Medicinal Chemistry, and Chemical Biology. Student support will commence in their second year of their Ph.D. program. The curriculum of the Training Program includes a novel student sabbatical to be completed while the trainee is supported by the training grant. Core courses in Chemical Biology and regularly scheduled opportunities for the trainees to present their research results to the Training Program Faculty and fellow trainees, as well as annual progress reports in March of each year, are also integral to the program.

2. Program Directors
- Program Director is John Montgomery, Ph.D., Professor of Chemistry. He has been on the CBI faculty since 2005 and took on the position of Director in January of 2013.

- Program Co-Directors are:
  - Anna K. Mapp, Ph.D., Professor of Chemistry and Director of the IDP in Chemical Biology
  - Stephen W. Ragsdale, Ph.D., Professor of Biological Chemistry, Medical School.

3. Administrative Structure / Academic Counseling
The administration of the program will be primarily the responsibility of the Program Committee of the Chemistry-Biology Interface Training Program. This committee oversees the ongoing operation of the program, and supervises academic affairs such as counseling and assessment of students' progress. The committee currently includes the director, Professors Montgomery (Chemistry), and two Co-Directors, Professor Mapp (Chemistry), and Ragsdale (Biological Chemistry), in addition to Marsh (Chemistry), Pecoraro (Chemistry), Osawa (Pharmacology) and Soellner (Chemical Biology). The Program Committee advises the directors on all aspects of the training program, the most critical being the recommendations for appointment of trainees, preceptor assignments, approval of student "sabbaticals" (vide
infra) and evaluation of the dissertation prospectus of each trainee. Many of the program functions such as recruiting and admissions, seminars, counseling, development of core courses, and evaluation of trainee progress, will be carried out by sub-committees and appointed individuals.

4. Trainee Selection Sub-Committee
All CBI Training Program faculty advisors will be alerted to trainee vacancies and will subsequently nominate students in their laboratories to participate in the training program. The nomination packet will include the nomination letter, the student's undergraduate and graduate transcripts, their GRE scores, letter(s) of recommendation, evidence of research productivity such as publications, manuscripts, scientific presentations, and other information that the advisor and student feel are relevant in the decision making process. The Trainee Selection Sub-Committee will evaluate the supplied information and select a subset of candidates that will be interviewed by three of the Selection Committee faculty to ensure that the student has a strong commitment to training at the Chemical Biology Interface, and this committee will pass the top candidate recommendations on to the Program Committee. Both the Selection Committee and the Program Committee will select trainees in an effort to obtain maximum intellectual capacity, commitment to interfacial chemical biology research and the range of scientific interest of all units in our program. These committees will also attempt to identify and appoint students to ensure that diversity of our trainees is irrespective of gender and is representative of all races and ethnicities of our student pool.

5. Recruitment of Faculty
There exists an excellent research environment at the University of Michigan. Strong faculties in the colleges of LSA, Medicine and Pharmacy and the Departments of Chemistry, Biological Chemistry, Medicinal Chemistry, and Biophysics Research Division make the institution one of the foremost in the United States. There exists a high degree of interdisciplinary collaboration, and this characteristic is an extremely strong attraction in the recruiting of new faculty to the University of Michigan. The CBI Program Committee’s goal is to have a full rotation of faculty over the next five years to enhance and strengthen their interdisciplinary collaboration. Faculty will be appointed for a 3-year renewable term.

Four Criteria for Appointment of Faculty:
• Research interest at the interface of Chemistry and Biology related areas
• Quality of research
• Peer-reviewed funding
• Willingness to participate in all aspects of the program

Mechanisms and Process for Appointment:
• Letter expressing interest to Program Director
• Review of letter and Curriculum Vitae (C.V.) by Program Committee
• Present seminar in Pharmacology, Medicinal Chemistry, Chemistry, Biological Chemistry or other appropriate seminar series
• Appointment by Program Committee
Requirements After Appointment:

- Biosketch Submittal
- Continuously update information on M-Train*
- Completion of PEERRS Exams
- Present and/or attend seminars in Pharmacology, Medicinal Chemistry, Chemistry, Biological Chemistry or other appropriate seminar series
- Attend Annual CBI Symposium

*M-Train is a database designed to facilitate the submission of NIH-type institutional training grants (T32s and similar). This resource is available to any training grant at the University of Michigan. The goal in creating the application is to reduce the administrative burden in collecting and formatting information for some of the standard tables required in new and competitive resubmissions for training grants. The application provides a workspace for each training grant director to collect information from participating faculty mentors and their trainees and to generate select required tables.

In the past several years, new faculty members, with strong ties to the CBI Training Program, have been recruited to Michigan. The updated faculty list may be found on the CBI website.

6. Trainee Candidates
Students are usually supported for two years (typically six students are usually appointed for each academic year). They are usually appointed in the second or third years. Rotations and preliminary coursework should be satisfied by appropriate prerequisites in chemistry and biology prior to joining the training program. Advanced requirements include a mandatory student sabbatical, which requires an 8-10 week visitation by the student in a collaborator's laboratory at an advanced stage of the student’s career, and two term enrollment in a one unit advanced seminar course. Qualification via a course in responsible conduct in research (RCR) is also required and must be refreshed every four years.

Students are nominated by faculty or the program committee. Students undergo interviews by a Trainee Selection Subcommittee consisting of three CBI faculty members and are ultimately selected by the Program committee.

Requirements for Appointment

- Research interests aligned with the goals of the CBI TP
- Desire for broader training at the interface of Chemistry and Biology
- Willingness to complete course work required for the Program
- Present a poster or seminar at the Annual CBI TP Symposium for the duration of their PhD. training (not only while being financially supported by CBI TP)
- Attend monthly meetings of CBI TP trainees (Sept-May) for the duration of their PhD. training (not only while being financially supported by CBI TP)
- Willingness to complete a Student Sabbatical at some point during the PhD. training and to provide a proposal for the sabbatical to the Program committee by the end of the first year of support.
- Provide a yearly Research Summary (due in October) to the Program Director
- Provide a yearly Progress Report (due in March) to the Program Director for the duration of their PhD. training (not only while being financially supported by CBI TP)
- Willingness to assist the CBI TP, e.g., Assisting with operation of the Annual Symposium
• Agree to provide education/employment data to the Program Director for up to ten years after receiving the PhD.
• Strong letter of recommendation by present mentor and other U of M faculty
• Strong Undergraduate and Graduate Achievement
• Interviews by Trainee Selection Sub-committee

7. Grant Award and Eligibility
The CBI Training Program is committed to providing all Ph.D. candidates with twelve months of financial support for the four-to-five years of their graduate program tenure. In order to continue to receive this support, students must make satisfactory progress toward the Ph.D. degree. Following completion of the first two years in residence with support from the CBI Training Grant, students receive aid through a combination of teaching and research assistantships, and fellowships. Support includes a generous stipend, tuition, and excellent health care benefits. Eligibility is based upon U.S. citizenship, Permanent Resident status, and underrepresented minority status.

8. Rackham Graduate School Student Handbook
Graduate students are responsible for knowing the information in this handbook, which is related to their conduct, degree requirements, graduate record, etc. The handbook also provides useful information about the University’s student services. The handbook’s www address is: http://www.rackham.umich.edu/StudentInfo/Publications/GSH/contents.html.

9. Preliminary Examination(s)
Each of the five participating units have individual requirements for advancing to candidacy for the Ph.D. These are appropriately administered by the degree-granting units and are designed to assure competence in each of the three basic fields. Currently, there are written proposals followed by oral examinations in Chemistry, Medicinal Chemistry, Pharmacology and Biological Chemistry. A similar system is proposed for the interdepartmental program in Chemical Biology. In addition, each department has some form of written examination as part of the candidacy requirements. The CBI Training Program does not involve any additional examinations, but the progress of the trainees is closely monitored by the Program Committee via regularly scheduled platform and poster presentations of their research.

10. Proposed Training
Students will typically be appointed to the training grant at the beginning of their second year of study. Students enrolled in the CBI Training Program will be required to enroll in the new seminar-based core course, Chemistry 548, “New Frontiers at the Chemistry-Biology Interface”. Students will also be expected to complete their “student sabbatical” prior to rotating off of the training grant. We envision that this sabbatical period will typically be completed during their third year in residence at the University.

11. Core Requirements
The CBI Training Program curriculum adopted a new core course, Chemistry 548, “New Frontiers at the Chemistry/Biology Interface. Additionally, Chembio 501 and 502 are requirements. Biochem 550 is substituted for Chembio 501 if the student has already taken this before entering the CBI program since both cannot be taken for credit.
New Frontiers at the Chemistry/Biology Interface
As part of the evolving curriculum of the CBI training program, we have developed a course required for all participating students entitled ‘New Frontiers at the Chemistry/Biology Interface’. Chemistry 548 is a course that was especially designed for CBI trainees. In this course, trainees select seminars at the University of Michigan that are within the scope of the frontiers of Chemistry and Biology. Each student is responsible for a presentation about a speakers’ work relevant to the seminar. This presentation will prepare the class for the seminar by the outside speaker, and will also give the students an opportunity for developing public speaking skills. The student presentation will take place approximately one week prior to the date of the outside speaker seminar. All trainees in the class attend all of the selected seminars discussed in Chemistry 548.

The goals of the class are three-fold: to promote interdisciplinary learning through seminar attendance in departments across the campus, to hone critical thinking skills through analysis of the current primary literature, and to increase knowledge breadth of participating students in both the chemical and biological sciences. This is a two-semester course that will culminate with a special seminar from a speaker selected and invited by the CBI trainees, assisted by the course coordinator.

12. Research Opportunities
Rotations:
All departments and programs have in place mandatory rotations for first-year students. Therefore, all students who are likely to be appointed to the training grant will have completed a minimum of two rotations prior to selecting an advisor. The precise details of each rotation program are slightly different; however, all faculty members of the training program have embraced the core ideals of the rotation system as an integral part of their respective Ph.D. training.

Mentor Selection:
The choice of a laboratory for the Ph.D. dissertation research is usually made by the end of the first year of graduate study, following completion of the laboratory rotation system implemented by each department or program. Faculty research interests are made known to the new students by departmental seminars, web-based departmental and personal resources, informal faculty presentations, and individual discussions between the student and faculty member.

Dissertation Research:
Prior to joining the training grant, the trainee will have chosen a laboratory for the dissertation research. Prior to the end of the second year, a written summary of the proposed research is presented and defended in an oral examination. In most cases, the committee that examines the student for advancement to candidacy for the Ph.D. continues as the student's dissertation committee.

Dissertation Committee:
This committee consists of at least four members of the faculty and includes at least one member who is not in the student's home department. This committee meets with the student at regular intervals during the course of the dissertation research, typically annually. Annual
As part of the CBI Training Program it is a requirement that all appointed students complete a Student Sabbatical by the end of your graduate studies (preferably by the end of 4.5 years in the graduate program). The Student Sabbatical proposal must be submitted by the end of the third year. The proposal must be approved by the CBI Program Committee before funding for the appointed student is terminated. Once the student has returned to the University of Michigan, from the Sabbatical, a one-two page written report, describing the entire experience, will be due within 30 days. Students will write a proposal that outlines an “advanced rotation experience”, preferably in a research collaborators laboratory. The site of the sabbatical may be in academe, industry or government laboratories. These laboratories may be physically located in Ann Arbor or other places in Michigan, as well as in more distant sites, including overseas. The proposal should describe a self-contained project that is relevant to the student’s thesis work. Regardless of the site for the sabbatical, it is expected that the student will physically move to the laboratory of the collaborator for the period of the sabbatical. If necessary, the sabbatical may be done over more than one visit. Examples of topics might include a synthetic chemist bringing compounds that were prepared to a laboratory to carry out biological evaluation, or an individual working on catalysis spending time in a computational laboratory to understand enzyme mechanism. When approved by the advisor, and with a letter of agreement from the host scientist in hand, the trainee will submit the proposal to the Program Committee for approval. Student support during this period will be the responsibility of the training grant, the research mentor and institutional sources such as the Rackham Graduate School. At the end of the sabbatical, a short report of research experience will be submitted to the program committee.

The format and requirements of the **Student Sabbatical Proposal** are as follows:

- **Cover Page**
- **Letter of Support from Sabbatical Host**
- **Letter of Support from the students Advisor**
- **Proposal Letter** (minimum of three pages and a maximum of five)

The requirements of the **3-5 page Proposal Letter** are as follows:

- **Background of Research/Studies at U of M**
- **Preliminary Work – explanation of ongoing work in your lab**
- **Actual proposal of the work to be completed at the Host location lab/industry**
- **Explanation of how the work completed on your Sabbatical relates to your thesis research at U of M.**

Again, as mentioned, this is a REQUIREMENT of the CBI TP. The Sabbatical is an integral part of the CBI TP, and all supported students must participate in this event. Once the sabbatical has been completed, a written Final Sabbatical Report, explaining & detailing your experience, will be due within 30 days of your arrival back to the University of Michigan’s Campus. The format and requirements of the Student Sabbatical Completion Report are as follows:
The requirements of the **Completion Report** are as follows:
- Explanation on the work completed at the Host location lab/industry, and what was achieved
- Explanation of how the work completed on your Sabbatical relates to your thesis research at U of M
- While it is unlikely that a research publication will have been submitted or written during this period, it is important that you inform us of any publications that were written as a result of the Sabbatical. Of course, if a paper has been written on this subject, we welcome this as an appendix to your report.

### 13. Ongoing Responsibilities
Following admission to candidacy, which normally occurs at the end of the second year, students are also monitored by thesis committees within their home departments; thesis committees must contain one faculty member from the CBI in addition to the mentor.
- Students will be expected to present results in poster format annually at the CBI Symposium that is associated with the last seminar of the year for students in the advanced seminar course.
- Students will be requested to provide a short summary of research progress toward their degree each winter term and either meet with a subset of the program committee or their thesis committee to ensure progress toward the degree is accomplished.
- Students will be required to fill out/ or update Biographical forms as part of their progress reporting process.

### 14. Contact Information
**CBI Program Information –**
- Training Program Director/PI: John Montgomery (734) 764.4424. jmontg@umich.edu
- Program Coordinator: Emilia León (734-763-1857). elleon@umich.edu