HANDBOOK
for
GRADUATE STUDENTS
in
BIOCHEMISTRY

Department of Biochemistry
University of Illinois
at Urbana

Biochemistry Office of Student Academic Affairs
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(Website: www.mcb.uiuc.edu/departments/biochemistry/)

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Introduction and contact information

This handbook is intended to provide incoming students in the Department of Biochemistry with the information necessary for completion of the Ph.D. and M.S. degrees. Contact Jeff Goldberg in the Biochemistry Office of Academic Affairs (jmgoldbe@illinois.edu, room 419 Roger Adams Lab; 244-3149) if you have questions of an academic or administrative nature. If you have questions of a scientific or professional nature, you should talk to your faculty advisor.

Department of Biochemistry contacts are:

Jeff Goldberg, Coordinator of Student Academic Affairs, Room 419 Roger Adams Lab; 217-244-3149, jmgoldbe@illinois.edu

Dr. James Morrissey, Acting Head of Biochemistry, Room 419 Roger Adams Lab; 333-2013, martinis@illinois.edu

Dr. David Kranz, Director of Graduate Studies, 244-2821, d-kranz@illinois.edu

Cara Day, Office Support, Room 419 Roger Adams Lab; 217-333-2013, caraday@illinois.edu

General Information

Mail - Biochemistry graduate students pick up their mail from the boxes located inside room 420 RAL. The mail for students is filed alphabetically according to their last name.

Parking - Metered parking is available on most streets throughout the campus and in municipal parking lots. Metered parking is also available on the lower level of the Krannert Center (vehicle registration and an “E” sticker is required.) These may be obtained from Campus Parking Division, 1110 West Springfield, Room 201, Urbana. Information concerning reserved parking spaces may be obtained from the Campus Parking Division. Be sure to register your car if you have one – you cannot park anywhere on campus without it.

Keys - All keys must be returned to the office that dispensed them (either 29A RAL or 419 RAL) when a student terminates his/her affiliation with the University.

School of Molecular and Cellular Biology

The School of Molecular and Cellular Biology (MCB) consists of the Departments of Biochemistry, Cell & Developmental Biology, Microbiology, and Molecular & Integrative Physiology and the Program in Biophysics & Computational Biology. The four Departments have affiliated themselves into a single school in order to provide their graduate students with a broad range of training and research opportunities. Over sixty active research laboratories are included in the School. One purpose of the School is to provide graduate students with a broad spectrum of excellent laboratories in which to conduct their research. Although the application process provides the opportunity to express preference for a particular department, all students are admitted into an umbrella program for the first semester and can select faculty research advisors from the entire faculty of the School. Students choose their thesis research lab at the end of the first semester. If a student chooses to do his or her thesis research in a lab outside the department to which he or she was originally admitted, the student will normally join the department to
which their thesis lab belongs. This arrangement emphasizes the connections among all areas of contemporary biological research and recognizes that beginning graduate students often have broad interests that may extend beyond a single department. During their first semester all beginning students in the school participate in research rotations, selecting laboratories from throughout the school.

Selection of Research Advisor

In order to acquaint new students with the research opportunities in Biochemistry and MCB, all new Ph.D. students register in MCB 581/582/583, which consists of Faculty Research Presentations and the Laboratory Rotation Program. All students will receive a grade of either “Satisfactory” or “Unsatisfactory” for MCB 581/582/583. Faculty Research Presentations is a series of talks held during the week before the start of the Fall semester in which most of the faculty who have lab openings describe their ongoing research projects.

New students then participate in a Laboratory Rotation Program involving three 5-week rotations in laboratories of Biochemistry and other MCB faculty. Students use the information presented in the Faculty Research Presentations as well as informal interactions with the faculty to identify labs in which to rotate. A prioritized list of faculty for rotations is submitted by each student to an MCB Committee, which assigns each rotation.

The laboratory rotations are intended to provide students with a genuine lab experience where they will learn and perform laboratory procedures. However, the time is short and a minimum expectation of a rotation is to allow new students to interact closely with the faculty, advanced graduate students and post doctoral associates, including attendance of regularly scheduled group meetings, to gain a good understanding of the ongoing research projects in these laboratories. The laboratory rotations provide an essential function by helping new students become more rapidly integrated into the department and by helping them learn more about the operations of the laboratories they may wish to join.

Some students may be interested in more faculty research programs than can be accommodated by the rotation program, or may not obtain a requested rotation. All students are therefore strongly encouraged to interact with additional faculty members and laboratory personnel to gain more information about further research opportunities throughout the Fall semester. It is also recommended that new students engage in individual discussions with all faculty in whom they are interested so that both the student and faculty can come to a clear understanding of the level of mutual interest. However, neither the faculty nor the student may make any commitment regarding final laboratory affiliation until the official commitment date, which is in early December. Upon the official commitment date, students should directly arrange their permanent lab assignments with their desired faculty mentor. This will be a mutual agreement between the faculty mentor and graduate student. No faculty member may accept more than two first year MCB students in his or her laboratory. Any unassigned students will consult with Dr. James Imlay, Associate Director MCB Graduate Program, for further assistance in laboratory affiliation.

Financial Support for Graduate Study

Financial support for graduate students includes appointments as teaching assistants (TA), research assistants (RA), Federal traineeships, and fellowships. The most common forms of financial aid available for graduate students in Biochemistry are the teaching and research assistantships. One-half (50%) time graduate assistant (RA/TA) stipends for the academic year are totaling $25,000 for first year students (see Jeff Goldberg, Coordinator of Student Academic Affairs, for updated stipend information, and for subsequent years). All teaching and research assistantships as well as fellowships are taxable, according to current Internal Revenue Service rules.  

NOTE: Ph.D. students who are making satisfactory progress toward the doctoral degree are guaranteed continued financial support through the end of their 7th year.
Obligations of TAs and RAs

Teaching Assistantships

The Department considers teaching experience essential training for a student’s development as a scholar and all Biochemistry graduate students are required to teach during their graduate training. A minimum of one semester (at 50%-time) of teaching is required for all Ph.D. students. Students are also expected to have received a grade of “B” or better in any course for which they serve as a teaching assistant. The performance of all TA’s is evaluated each semester by the course instructor and students. This evaluation becomes part of the TA’s permanent record. The obligations of the teaching assistant can fall into one of several categories. A one-half time teaching assistant in an undergraduate laboratory course is expected to spend approximately eight contact hours per week in the laboratory plus an additional twelve hours per week in preparation time. An equivalent amount of time of 20 hours is expected for a TA who is assigned to lecture course discussion sections. Other fractional time appointments, i.e. a 25% TA, would be expected to spend a proportional number of hours in the course.

All new students are required to participate in the Teaching Assistant Orientation Program in January of their first year. Upon officially entering a Biochemistry lab contact Jeff Goldberg, Coordinator of Student Academic Affairs, for more information.

International Student Test of Spoken English (TSE/SPEAK/TOEFL IBT) Test

Illinois state law requires that all instructors at the University of Illinois be orally proficient in English to be eligible to teach. Graduate students for whom English is not their native language must achieve a score of 50 or higher on the TSE exam (or SPEAK exam taken at UIUC) or 24 on the Speaking component of the TOEFL IBT exam. Students may take the SPEAK test a maximum of three (3) times at UIUC. In addition, campus policy requires those who pass the test to attend the next available Teaching Assistant Orientation; this includes a session specifically for International Students. It is the Department’s policy that students must pass the SPEAK exam before they are allowed to take their Research Qualifying Examination. It is the student’s responsibility to take the TOEFL IBT or TSE exam prior to enrollment or during the first semester in the Biochemistry Program. The student must register for any subsequently required ESL courses [504/506] and pass the TOEFL IBT/TSE/SPEAK exam no later than the spring semester of the second year in the program. Failure to pass the TOEFL IBT/TSE/SPEAK test by this time may result in the student’s dismissal from the Program.

Research Assistantships

The research assistant is obliged to perform research under the auspices of the research grant, which pays for his/her assistantship. Under normal circumstances, this research work is the same as work done in pursuit of the Ph.D. thesis. Specific duties are assigned by the research director and, in general, involve the performance of research work related to your thesis topic and other duties related to the conduct of research in your advisor’s laboratory. Research assistants are required to satisfy the research director that their effort is adequate.

Overview of Ph.D. and M.S. Degrees in Biochemistry

Admissions Requirements

Admission to the Biochemistry Ph.D. graduate program is limited to graduates with Bachelor degrees equivalent to those of the University of Illinois. Generally, admission is limited to undergraduates who have completed a degree program with a major in biochemistry, chemistry or biology. Biology majors should have a strong chemistry minor. Thus, accepted applications are expected to have a basic background in organic and physical chemistry, in biology, and in mathematics through calculus. Students lacking such background will be required to make up these deficiencies during the course of their graduate study. Current admissions generally require students to have undergraduate grade point averages
of 3.2 or greater (on a 4.0 scale). Admissions are limited to students possessing at least a 3.0 average over the student’s last 60 hours of undergraduate work, or last 60 hours of undergraduate work and total accumulated graduate work, whichever is appropriate.

**Goals of the Ph.D. Program**

The faculty of the Department of Biochemistry have endorsed the statement on “Standards for the Ph.D. Degree” issued by the International Union of Biochemistry (found in the Appendix). This is a statement of general philosophic ideals toward which we believe all students should strive and which faculty support. Students should keep these goals in mind as they pursue their Ph.D. degree and consider ways of achieving the kinds of competency that are listed. The Biochemistry faculty also accepts the responsibility of working toward these goals. Clearly, both formal course work and a variety of informal mechanisms can be used to develop the strengths described in the statement. Students should consider especially whether their use of the informal mechanisms available is adequate. The faculty is open to suggestions as to new mechanisms that need to be developed.

**Academic Advising**

Once students have been assigned to a laboratory to start their thesis research, the thesis supervisor acts as the major academic advisor. However, the Director of Graduate Studies in Biochemistry and the Coordinator of Student Academic Affairs continue to be available for advice on any issues pertinent to the graduate program.

**Research Ethics and Responsibilities**

Ethical conduct is an essential part of the scientific enterprise. To that end graduate students in the Department of Biochemistry are expected to follow the ethical standards and principles set out in the University of Illinois document on *Policy and Procedures on Academic Integrity in Research and Publication* (see the section on Academic Integrity in the *Graduate College Handbook for Students, Faculty and Staff* - http://www.research.illinois.edu/ai/index.asp).

In all areas of scholarship, in coursework, in teaching and in research, plagiarism is a major ethical transgression, which the University takes very seriously. It will always lead to disciplinary action, and may result in dismissal from the University. Students should therefore take pains to understand fully what constitutes plagiarism.

In their capacity as teaching assistants in Biochemistry, graduate students should work with the course instructors to provide the best possible instruction to their students, should avoid any kind of discrimination in their dealings with students, and should provide a fair evaluation of their students’ work. Because they hold power over their students, they should always behave so as to avoid even the appearance of exploitive or improper actions, or conflict of interest.

As researchers in Biochemistry, graduate students should keep accurate, up to date records of their research data in a form that can be stored and easily retrieved by their advisors and other authorized scientists. During the course of laboratory research, graduate students should follow all appropriate regulations and procedures for the handling of human materials, animals, and hazardous materials. When reporting or publishing research results, graduate students should assess and present data honestly, acknowledge the work and contributions of others, and provide accurate and complete literature citations. With the knowledge and approval of their advisors, graduate students should share data with collaborators, and should provide reagents to and share their knowledge with scientists within the University of Illinois and outside of it.
**Stages of the Doctoral Program**

The University of Illinois *Graduate College Handbook for Students & Advisers* specifies three stages for the doctoral program, each of approximately 32 credit hours (see: http://www.grad.illinois.edu/gradhandbook/chapterVI/section03.)

**Stage I** is completed when the student has received a minimum of 32 hours of credit distributed as specified by the requirements of the degree program, commonly equivalent to a Master’s degree. The Department of Biochemistry certifies fulfillment of Stage I after completion of the required courses (MCB 501/502/580/581/582/583/BIOC555/440/446/590JC) and approved elective courses (see appendix for list of courses), usually after four semesters.

**Stage II** includes fulfillment of all major/minor requirements and successful passage of the Research Qualifying Oral Exam. Note: the Department of Biochemistry certifies fulfillment of Stage II upon successful completion of (1) a Research Qualifying Oral Exam, (2) Course Requirements, (3), Preliminary Oral Exam and (4) the SPEAK test of Spoken English for international students. All reasonable efforts should be made to fulfill Stage II by the end of the graduate student’s third year.

**Stage III** includes fulfillment of at least one successful Annual Review (Grad Student Seminar) and completion of a one-semester teaching requirement, if it has not already been completed in Stage II of the Doctoral Program. In general, Stage III is primarily focused upon research, preparation of a dissertation, a final examination and deposit of dissertation.

The Department faculty reviews the records and progress of all Biochemistry graduate students in an annual meeting that is typically held late in the Spring semester. General regulations relative to residence, examinations, required credits, and thesis research are those specified in the *Graduate College Handbook for Students, Faculty and Staff*.

**Degree Requirements**

**Doctor of Philosophy**

The Doctor of Philosophy (Ph.D.) degree at the University of Illinois requires a total of 96 credit hours. Specific degree requirements for the Ph.D. degree in Biochemistry include the successful passage of the Biochemistry/MCB core courses: MCB 501 (Advanced Biochemistry, 4 hrs), MCB 502 (Advanced Molecular Genetics, 4 hrs), MCB 580 (Research Ethics & Responsibilities, 1 hr, S/U), and MCB 581/582/583 (Lab Rotations, 1 hr each), plus BIOC 555 (Analysis of Biochemistry Literature, 2 hrs). Physical Chemistry/Physical Biochemistry is also required (CHEM/BIOC 440B and BIOC 446 - see Physical Biochemistry section below). In addition, at least 8 hours of advanced coursework (“electives” - approved 400-500 level*, and not BIOC 590 lab, 595 or 599) must be completed in the major field.

Satisfactory completion of MCB 501/502/580/581/582/583 during the first year and a minimum of 6 hours of advanced coursework by the end of the second year is expected. Additional coursework should be planned with the advice of the student’s thesis advisor and Ph.D. Advisory Committee.

* See list of approved advanced level courses in Appendix; updates are available in the Student Academic Affairs Office.

Doctoral degree candidates must complete at least 64 hours of BIOC 599 (Thesis Research).

In addition to formal course work, all students are required to register and participate in the Biochemistry Seminar (BIOC 595 – 1 hr) each semester throughout their degree program. First and second year students are required to participate in the seminar Journal Club and register in BIOC 590JC for 1 hour of credit per semester. Students also receive academic credit for participation and attendance in laboratory
group meetings and should register for 2 hours of S/U credit each semester under their research advisor’s BIOC 590. Students are required to maintain a 3.0 GPA (“B” average). A minimum of 1 semester of teaching is required. There is no foreign language requirement for the Ph.D. degree in Biochemistry.

**Master of Science**

The Master of Science (M.S.) degree requires a minimum of 32 credit hours. Specific degree requirements for the M.S. degree in Biochemistry include the successful passage of a core of Biochemistry/MCB courses: MCB 501 (Advanced Biochemistry, 4 hrs), MCB 502 (Advanced Molecular Genetics, 4 hrs) or other Gene Expression course, (3 hrs), BIOC 455 (Techniques in Biochemistry & Biotechnology, 4 hrs), or equivalent experience or courses taken at other schools (approved by advisor on starting graduate school), MCB 580 (Research Ethics & Responsibilities, 1 hr), and MCB 555 (Analysis of Biochemistry Literature, 2 hrs). Physical Chemistry/Physical Biochemistry is also required (see Physical Biochemistry section below).

A Course work Master’s degree requires a minimum of three full-time semesters and 32 hours of advanced coursework (500-level or approved 400-level*), including the specified requirements (above), and Physical Chemistry/Biochemistry. In addition, at least 12 hours of advanced coursework (“electives” - 500-level or approved 400-level*) must be completed in the major field (BIOC/MCB). Course electives may not include BIOC 595 (seminar), but up to 4 hours of research (BIOC 590 lab or 599) or Journal Club (BIOC 595 JC) may be counted towards the 32 total hours, with approval.

* See list of approved advanced level courses in Appendix; updates are available in the Student Academic Affairs Office.

Graduate College requirements:
Core curriculum: 32 hours; Total Hours: 32
Minimum Hours Required Within the Unit: 8 hours
Minimum 500-level Hours required: 12 hours
Minimum GPA: 3.0

A Thesis Master’s degree usually requires a minimum of two year’s work, with at least 12 hours of thesis research (BIOC 599). The coursework for a thesis Master’s follows the requirements of the doctoral degree for Year 1 and Year 2. The thesis must be approved and accepted by the student’s research advisor. The thesis must be deposited with the Graduate College. All students are expected to register and participate in the Biochemistry Seminar (BIOC 595 – 1 hr) and in the seminar Journal Club (BIOC 595 JC - 1 hr) each semester throughout their degree program. Course electives may not include BIOC 595 (seminar), but up to 4 hours of research (BIOC 590 lab or 599) or Journal Club (BIOC 595 JC) may be counted towards the 32 total hours, with approval.

Graduate College requirements:
Core curriculum 20 hours; Thesis Hours required (599): 12; Total Hours: 32
Minimum Hours Required Within the Unit: 8 hours
Minimum 500-level Hours required: 12 hours
Minimum GPA: 3.0

**Physical Biochemistry**

One year of physical chemistry is required. Many students have not taken two semesters of physical chemistry at the time of entry into the program, and they automatically take both courses listed below. The physical chemistry requirement for the Ph.D. or M.S. degree in Biochemistry consists of:

Principles of Physical Chemistry – BIOC 440/CHEM 440B (Biological Perspective) - an equivalent course taken previously (either as an undergraduate or graduate) may be accepted* if passed with a grade of “B” or better. This requirement may also be met by receiving credit in both CHEM 442 and 444.
* - To be determined by departmental advisor upon entering the program.

And

Physical Biochemistry – BIOC 446

Organic Chemistry

A strong background in organic chemistry is an important prerequisite for biochemistry coursework. Depending upon your area of interest and with advisor approval, it will be determined what courses, if any, need to be taken.

Biochemistry Seminars (BIOC 595) and Departmental Journal Club (BIOC 595 JC)

The Department has two seminar programs – the Departmental Seminar and the Graduate Student Research Seminar. Attendance of both is mandatory for all students. Students obtain 1 hour of credit per semester by registering for the Biochemistry Seminar course.

Departmental Seminar Program (BIOC 595 section A)

The Department of Biochemistry hosts a weekly seminar series of predominantly outside speakers, which is normally held at noon on Friday. All graduate students are required to attend all of the scheduled departmental seminars and sign an attendance sheet. Occasionally additional seminars are scheduled at different times, and attendance at such seminars is also required. The primary goal of this seminar program is to enhance the intellectual atmosphere of the department by presentation from outside speakers that either complement or extend research within the department. The visitors meet with both faculty and students to allow in-depth exchange of ideas and technical expertise.

Graduate Student Research Seminar Program (BIOC 595 section A)

The Department of Biochemistry hosts a weekly student seminar program held at 4:00 pm on Wednesday. All graduate students are required to attend all of the student seminars and are expected to participate actively. Students must sign an attendance sheet each week.

Although the seminar course (BIOC 595) is graded (S/U) based upon attendance, the goal is for students to develop communication skills and to receive feedback on their research progress.

The goals of this seminar program are to enhance the intellectual atmosphere of the department, to provide students opportunities to develop skills in publicly presenting research results, and to facilitate faculty monitoring of student research progress. Following the successful passage of the Preliminary Oral Examination, students will present an annual 30-minute, public research seminar starting in their fourth year and continuing through the last semester before their thesis defense. The Biochemistry Office of Student Affairs will require confirmation from the Research Advisor on the anticipated graduation date. With approval by the Head of the Department, a student may substitute their annual department seminar by publicly speaking on their thesis research at a campus symposium or conference. Attendance of these seminars is mandatory for all students throughout the program. Requests for excused absence should be made in a timely fashion to the Office of Student Academic Affairs, copied to the Head of Department. Notification of conflicts with class schedules should be made to the Office of Student Academic Affairs at the beginning of the semester.

One week prior to the seminar, the student will provide a one (1) page summary of research accomplishments in the past year and a one (1) page summary of research plans for the coming year to Jeff Goldberg in the Biochemistry Office of Student Academic Affairs, as well as an updated curriculum
Students receive credit for participating in the Graduate Student Research Seminar Program by registering in the Biochemistry Seminar course (BIOC 595 A) for 1 hour of credit per semester. Although the course is graded Satisfactory/Unsatisfactory on the basis of attendance, the primary goal is to develop skills and provide feedback on research progress. Students begin registering for the seminar course in their first year (Spring semester), and begin their annual presentations one semester after passing their research qualifying examination, usually at the beginning of their third year. Presentations and registration continue until the semester before their thesis defense. (Students who have class and/or teaching assignment conflicts that prevent routine attendance, should notify the Office of Student Academic Affairs at the beginning of the semester. These students, as well as those completing their dissertations, are encouraged to attend whenever possible.) Each student’s presentations will be scheduled as regularly as possible, i.e., at similar times each year, so the student knows well in advance when his or her talk will be held. Students being scheduled for the first time are generally assigned dates later in the year, but have at least 1.5 years to start their research and acquire adequate data for preparation of a seminar. Students continue to make annual presentations until they are within one semester of defending their dissertation (see below).

**Benefits**

- Students learn to present their research in public to a general science audience.

- Students receive regular feedback and advice on their research projects. The progress of our students is regularly monitored and they receive formal and regular feedback.

- A high level of participation in such a visible research-oriented activity helps build the intellectual “atmosphere” of the department.

- Increased knowledge of one another’s research facilitates inter-group interactions.

- The students and faculty are able to meet on a regular basis, thereby encouraging more student-faculty interactions.

- Students receive academic credit for registration in the course.

In addition, faculty and postdoctoral associates participate in the seminar program by giving full length (50 minute) talks. The entire faculty is expected to rotate through the schedule and provides an opportunity for students to hear an overview of each laboratory’s ongoing research directly from the faculty member.

**Seminar Journal Club (BIOC 595 section JC)**

Designed specifically for new graduate students, this course utilizes the subject matter of the weekly departmental (Friday) seminars to provide a focus of learning and understanding the background for the seminars and techniques of current research. The primary goal is to train students in the essential skill of understanding the most up-to-date research and accessing the primary research literature. Reading and analyzing published work on the seminar topic prior to the seminar allows students to fully engage in the departmental seminar program. First and second year students are required to participate and receive course credit by registering in BIOC 590-JC for 1 hour of credit per semester. The Seminar Journal Club meets on Tuesdays from 5:00 – 6:00 PM. The course is graded as Satisfactory/Unsatisfactory, based upon attendance at both the journal club and the seminars (595 A).
Students will be required to read one assigned paper authored by that Friday’s invited speaker, and the paper will be discussed at the previous Tuesday evening meeting. The discussion is typically facilitated by the faculty member who invites and serves as host of the speaker, or by a designated senior member of the host’s laboratory, if the host is unavailable. Students should come prepared to ask questions about the work and to participate actively in the discussion. The goal for this class is that the informal discussion be essentially student-led.

**Lab Group Meetings**

Biochemistry graduate students receive academic credit for participation and attendance in laboratory group meetings. Students are required to register for 2 hours of credit each semester under their research advisor’s BIOC 590 section. This course is graded Satisfactory/Unsatisfactory. *In the second semester of their first year (the first semester in their chosen research lab) and in the first summer, students also use this course rubric to sign up for research (in lieu of 599), for example for a total of 6 hours.*

**Exam and Committee Meeting Milestones**

- **Year 1 – December:** Graduate student joins a research laboratory
- **Year 2 – Feb-March:** Ph.D. students undergo the Oral Research Qualifying Exam to determine research potential with a “Qual” committee that is assigned by the Department Head.
- **Year 3 – Oct-Dec:** Ph.D. students undergo the Preliminary Exam to determine research progress with a Dissertation Committee that is selected by the student and their advisor with approval of the Department Head.
- **Year 4 –** In an annual review, Ph.D. candidates provide an on-campus public presentation of their research progress. This will normally be during the Department Wednesday afternoon seminar, although student oral presentations at campus symposiums are also acceptable venues. The Dissertation Committee members will be present unless conflicts such as teaching obligations and travel plans exist.
- **Year 5 –** In an annual review, Ph.D. candidates provide an on-campus public presentation of their research progress. This will normally be during the Department Wednesday afternoon seminar, although student oral presentations at campus symposiums are also acceptable venues. The Dissertation Committee members will be present unless conflicts such as teaching obligations and travel plans exist.

6 month (pre-defense) meeting: Upon the recommendation of the Research Advisor, the Ph.D. candidate arranges a meeting with their Dissertation Committee with a timeline that is estimated to be 6 months prior to the dissertation defense. This meeting briefly highlights published papers, manuscripts in preparation, and details experiments that need to be completed prior to the dissertation defense.

**Research Qualifying Examination – “Qual”**

The Research Qualifying Exam (“Qual”) serves as the Department’s primary activity to determine research potential, but it is not the same as the Graduate College Preliminary Exam. The Qual consists of:
- a short (3 page maximum), written outline of the project, including a summary of research progress so far, plans (or "Aims") for future work, and some vision of what “the project” is. References may be attached on additional pages.

- an oral examination on the research. The format is that of an oral “chalk talk”; PowerPoint presentations, transparencies and handouts cannot be used. A brief outline can be written on the board prior to the beginning of the exam. An especially complex molecular structure may also be drawn, if needed. The overall goal is to establish the student's understanding of his or her hypothesis-driven project and the background, including relevant literature. It is expected to include some preliminary data and plans for future work, including some vision of what “the project” is.

The Research Qual committee is appointed by the Head of the Department by random drawings specifically excluding the research advisor. The Research Advisor is permitted to recommend one committee member who has expertise in the student’s research area. This recommendation is subject to approval by the Head of the Department and/or the Director of Graduate Studies. Input from the research advisor is provided in a letter, which is read at the end of the oral exam if the committee is considering a conditional pass or fail for the student performance. The Qual committee signs a form indicating pass, fail or conditional pass (which requires some specific recommendation for further evidence of competence, often a paper on a relevant topic.)  

This constitutes the Grad College requirement for a 2 year review.

**Purposes**

The Ph.D. degree is awarded to students who have demonstrated that they are able to conceive and carry out original research. Therefore, one of the requirements for Ph.D. students in the Department of Biochemistry is the demonstration of their potential to become effective research biochemists. The demonstration takes the form of an oral examination that deals directly with the student’s thesis research project and with related aspects of biochemistry that impinge upon the project. The examination asks (a) how well the student understands the background and rationale for the research project, and (b) his or her ability to form a short and long-term hypothesis-driven experimental plan with a clear understanding of the approaches, techniques, projected outcomes and potential pit-falls of the project. In particular, the purposes are the following:

1. To motivate the students to:
   - focus, at the earliest possible time during their period of graduate study, both their thinking and their activities on their research project,
   - integrate the knowledge obtained in course work with the goals and rationale of the research project,
   - gain a thorough, in-depth grasp of the biochemical literature that pertains to their research project, and
   - develop a clear perception of the goals of their research project as they relate to the advancement of biochemical knowledge in their research area.

2. To provide a fair and thorough means for verifying that the graduate student shows promise of becoming adept in both the physical and scholarly aspects of biochemical research. This includes the ability to “think scientifically” and approach research problems.

**Nature of the Research Qualifying Examination**

During the early part of the fourth semester of their graduate study at Illinois, each Ph.D. student in Biochemistry meets with a faculty Committee for an oral examination of the progress of the student’s research work. A delay of one semester’s duration can be granted for a student who changes labs. (See section below for rules applying to MD/PhD students – Medical Scholars.)
The Committee, which does not include the thesis advisor, is composed of three faculty members with academic appointments in the Department of Biochemistry and is selected by the Department Head by random drawing one semester prior to the scheduling of the research conference. Exam dates are also selected by random drawing. One member of the Committee is designated as Chair of the Committee.

If either the faculty advisor or the Chair of the Research Qualifying Committee feels that none of the committee members selected is knowledgeable in the general research area of the candidate, either may request one replacement with more appropriate expertise. Changes in committee membership may be made up to one month prior to the scheduled date of the exam by notifying the Department Head.

At least one week prior to the conference, the student will give the Biochemistry Office of Student Academic Affairs and also each member of the Committee a copy of a brief (3 pages maximum) statement of the research project in progress. This statement should include the background and status of the research project; the progress to date; the hypothesis, plans, and methods of approach for future work; and selected references to the literature. One additional page may be used for Figures, as needed.

At least two days prior to the oral exam the student will deliver to the Chair of the Committee his/her research notebook(s), properly indexed.

**Conduct of the Examination**

1. **Areas that may be covered or types of questions asked:**
   
   a. The research of the candidate (the focus)
      -- Goals
      -- Reasons for experiments
      -- How the goals fit into the large scientific questions
      -- Future experimental plans
   
   b. The background literature
   
   c. Alternative approaches that might be used to achieve the goals of the work, even if the techniques are not ordinarily used in the advisor’s laboratory
   
   d. How methods that are used in the project work, including potential pitfalls and ambiguities.
   
   e. Questions such as “How would you show …”, “What if …, what would you do then?” In other words, questions on experimental design in order to test the student’s ability to propose reasonable experiments and think about them critically.

2. **Letter from the research advisor.** The research advisor will submit a letter of evaluation to be read at the end of the exam in those cases in which the committee needs to consult it. The letter is thereafter destroyed and does not become a part of the student’s record.

3. **Results.** The results of the examination will be one of the following:

   **Qualified.** May continue in graduate program

   **Provisionally qualified.** The general reaction of the Committee is positive, but certain deficiencies need to be remedied, after which the Committee will certify the qualification.
Unqualified. The student is permitted to reschedule a second conference with a different Committee, by the end of the following October.

Not qualified. The student may not proceed toward a Ph.D. in Biochemistry at the University of Illinois.

Note: Students with a GPA less than 2.75 may take the research qualifying exam, but are not guaranteed of continuation in the program.

Medical Scholars Program – MSP (MD/PHD students)

Qualifying Exam

Medical Scholars in Biochemistry are required to take the Research Qualifying Examination in Biochemistry in the early part of their fourth full semester as a Ph.D. candidate in Biochemistry. This period does not include time spent primarily in Medical School studies, e.g., M1, M2 years. It is the responsibility of the thesis supervisor to certify to the Department when it is appropriate for a Medical Scholar to take the Research Qualifying Examination, i.e., the time when he or she should have had the research training and experience equivalent to Ph.D. candidates at the end of their fourth semester in Graduate School.

SEQUENCE OF STUDIES AND ACADEMIC PROGRESS

The Medical Scholars Program (MSP) provides an academic environment for integration of graduate and medical education and expects students to proceed at an appropriate pace through their dual degree studies. The time schedule for meeting the various milestones (preliminary examinations, course requirements, qualifying examinations, National Board examinations, and the like) will be based on established guidelines in consultation with the student and their graduate advisor. It is recognized that individual programs of study may vary greatly with respect to sequence due to factors such as differences in requirements among graduate programs, funding considerations, and the nature of the research. Consequently, petitions for exceptions to the policy may be approved by the Director of the Medical Scholars Program.

In order to assure both integration and reasonable academic progress:

1. All MSP students begin their studies in full-time graduate course work and/or research. Exceptions are granted for students already enrolled in medical studies and may be granted for students already enrolled in graduate study in the department in which they intend to do their PhD at the time of admission to the MSP. Students are encouraged to take M1 classes while completing their graduate program requirements.

2. Students are expected to complete the Ph.D. (final defense) by the end of the second year of the medical curriculum (M2) or the student will be dropped from the roster. It is highly recommended the student defend prior to initiating the second year (M2) of the medical curriculum. Exceptions to this policy require explicit permission from the graduate thesis advisor and the MSP Director. The graduate advisor might also wish to consult with the student’s thesis committee.

3. M.D./Ph.D. students granted exceptions to policy 2 above must progress to Stage III of their graduate program prior to participating in more than one clerkship rotation in the medical curriculum.

4. As per COM policy, MSP students must pass all M-1 courses taken during each academic year including summer makeup examinations(s). Students must repeat all M-1 courses taken to date if students fail any component of the M-1 curriculum.

Selection of the Ph.D. Dissertation Committee

Following successful completion of the Research Qualifying Exam a Ph.D. Dissertation Committee must be selected as soon as possible. This committee is typically chaired by the research advisor and
constitutes a working basis for the Ph.D. Thesis Final Committee. It should also have three other members of the Graduate Faculty chosen jointly by the candidate and research advisor, have at least two members from the Department of Biochemistry (primary) and two with tenure. This Committee will administer the Preliminary Examination in accordance with the Graduate College requirements. Also, the purpose of the committee is to provide on-going advice to the student concerning his or her research project, and the composition of the committee may need modification to provide the expertise commensurate with this expectation. This committee must be appointed by the end of the semester in which the Qualifying Examination is completed, and the Office of Student Academic Affairs notified. Changes in the composition of the committee can be made at any time, as might be appropriate to developments in the research project, or as dictated by faculty sabbaticals departures from campus.

The Preliminary Examination (“Prelim”)

This is a Graduate College requirement for a student to enter Stage III of a doctoral degree program. It is expected to render approval of the student’s academic and scholarly progress, and attainment of a minimum of 64 hours of qualifying graduate course credit, including deferred 599 (research) credit hours. For the Biochemistry department, the Prelim will be held by the end of the Fall term of the student’s 3rd year. A closed rigorous examination will be conducted by the student's advisory committee, which includes the research advisor as Chair. The exam will focus on progress of the student in their dissertation project.

The Prelim Exam consists of:

- a short (3 page maximum), written summary of research progress so far and some plans for future work. Refined figures with figure legends may be attached as evidence of research progress. This document should be reviewed, edited, and approved by the research advisor. At least one week prior to the Prelim Exam, the summary of research progress should be submitted to the student’s dissertation committee and copy Jeff Goldberg.

- an oral examination on the research progress. The format is that of a Power Point presentation. The student should provide some background, but largely focus on research progress, pending manuscript publications, and future work that will be included in the dissertation.

The student and their Ph.D. Advisor are responsible for selecting the Prelim committee, but the committee is subject to the approval of the Head of the Department. This Committee, which is expected to serve as the Dissertation Committee is responsible for administering the Preliminary Examination. The Prelim committee signs a form indicating pass, fail or conditional pass (which requires some specific recommendation for further evidence of research progress.) This constitutes the Grad College requirement for a Preliminary Examination.

The Preliminary Examination will be required by the end of the Fall term of the student’s third year. If agreed, the student’s Thesis committee signs the Graduate College Preliminary Examination form, thereby verifying that the Research Qual, all required course work and satisfactory research progress is being made. This marks the end of Stage II and the beginning of Stage III – meaning that the student has no other degree obligations except performing thesis research (and possibly the one semester teaching requirement).

Results. The results of the examination will be one of the following:

__ Pass the candidate.

__ Fail the candidate. A program may, but is not required to, grant the student another opportunity to take the examination after completing additional course work, independent study, or research, as
recommended by the committee. However, if a second attempt is given, a new committee must be appointed by the Graduate College. The new committee may, but does not have to, consist of the same members as the original committee. After a fail result, a student will only be allowed to take the preliminary examination one additional time while working toward the completion of any one program of study.

__ Defer the decision. If this option is chosen:
1. the same committee must re-examine the student,
2. the second exam must occur within 180 calendar days of the date of first exam, and
3. the outcome of the second exam must be pass or fail.

### Annual Review

An annual review of the student’s progress is made by the Ph.D Dissertation Committee. The Annual Review is normally based on the student’s annual research seminar presentation, or any other campus equivalents (such as one of the Training Grant Symposia). The student prepares a 2 page research summary of past year accomplishments and future plans, as well as their curriculum vitae, which is submitted to Jeff Goldberg in the Biochemistry Office of Student Affairs for distribution to the Ph.D. Dissertation Committee. If there are concerns about the research project or its progress, the Chair or any committee member of the Ph.D. Dissertation Committee may call for an additional closed meeting with the student’s entire Ph.D. Advisory Committee to discuss the research accomplishments, progress, and plans. The chair of the advisory committee (normally the student’s thesis advisor) summarizes the committee’s findings, including any recommendations to the student, on the Thesis Committee Summary Form, signs it and delivers it to the Office of Student Academic Affairs. A copy is sent to the student and the original placed in the student’s file in the Biochemistry Office of Student Academic Affairs.

### “Six Month (pre-defense) Meeting” - Thesis Planning Meeting with the Advisory/Thesis Final Committee

When the student and advisor determine that the student is approximately one semester or 6 months from defending, the student will arrange to meet with the Ph.D. Dissertation Committee to review the proposed content of the thesis and notify the Biochemistry Office of Student Academic Affairs. This is commonly referred to as “the 6 month meeting.” The Department’s expectation is that by the time of this meeting the student will have sufficient material for at least one first-authored publication in a major refereed journal. Normally, the meeting will be called and scheduled by the student in consultation with the advisor. One week prior to this meeting, the student will present to the Dissertation Committee a document that includes their curriculum vitae, a thesis cover page, proposed abstract of the thesis, and a detailed outline of the experimental chapters that might serve as the thesis Table of Contents. A copy will be provided to the Biochemistry Office of Student Academic Affairs.

Importantly, the meeting is NOT intended to provide a progress report but to succinctly describe what additional work is needed to complete and write up the thesis research. Thus, the student should plan an approximately 20 minute presentation that includes no more than 5 minutes of background material and an outline of the student’s published work. The student should use the remaining 15 minutes to present an experimental plan to complete pending publications that will finalize his or her thesis work. The thesis planning meeting should comprise an active discussion between the Ph.D. candidate and his or her Ph.D. Dissertation Committee. In the event that the thesis is not submitted to the Ph.D. Advisory/Thesis Final Committee in a timely manner following this meeting (in a time period that exceeds a year) another thesis planning meeting will be called. A formal notification of this meeting should be given to the Biochemistry Student Academic Affairs Office.
The **Ph.D. Dissertation Committee** is the final composition of the Ph.D. Advisory Committee, first appointed after the Research Qual. It is chaired by the research advisor and includes at least three other members of the Graduate Faculty chosen jointly by the candidate and research advisor. At least two of the committee members must be primary faculty members of the Department of Biochemistry. Additional members may be appointed at the request of the student in consultation with the advisor. The members of the committee should have expertise commensurate with the research project to be conducted by the student. The composition of this committee must be set by the time of the 6 month meeting.

**Final Examination for Ph.D. in Biochemistry** (You should obtain a Ph.D. Final Defense Checklist from the Coordinator of Student Academic Affairs for more details).

1. In consultation with and approval by the Research Advisor, the Ph.D. candidate may schedule a tentative thesis defense date and time to accommodate and coordinate the schedules of the Thesis Final Committee. The Biochemistry Office of Student Affairs should be notified and will assist with reserving an appropriate room for the public defense.

2. Two weeks prior to the tentative thesis defense date, the candidate for the degree will deliver a draft copy of his/her thesis to each of the members of the Thesis Final Committee. *This copy will have been read and approved by the thesis advisor for both form and content and will be considered to be in final format, pending changes recommended by the Committee.* If portions of the thesis have been published previously, reprints should be provided to the Committee along with the thesis.

   Reasons for declaring a thesis unacceptable include, but are not restricted to: 1) poor presentation, including grammar and organization; 2) scientific inaccuracies; 3) ambiguity about the candidate’s contribution to collaborative work and 4) ambiguity about the candidate’s authorship of chapters that have been published.

3. The candidate must present an open (public) seminar in defense of his/her thesis. The Biochemistry Office of Student Academic Affairs will be responsibility for publicizing the open seminar.

4. Following the public defense, the Thesis Final Committee and any other faculty member of Department of Biochemistry who so desires will meet with the student concerning the thesis. The thesis will be revised, if necessary, after this meeting. Final approval of the thesis requires assent of each member of the Committee. The Research Advisor will provide signature approval of the thesis when all of the expectations and requests of the Committee have been satisfied. The Head of the Department will provide signature approval when all Department requirements have been fulfilled.

5. The candidate will deposit one bound and electronic copy of the thesis with the thesis advisor in addition to the copies required by the Department and College. The Department also requires that the candidate deposit a paper copy and an electronic version (CD) of his/her thesis with the Department.

**Other items of interest**

**Change of Thesis Advisors**

There are a number of personal, academic, and professional reasons whereby the relationship between a graduate student and his/her thesis advisor may prove to be unproductive. As a first step, we strongly recommend that the student attempt to resolve difficulties before seeking a new position with another faculty member. Should the student and advisor fail to resolve their differences, we advise the student to seek counsel with the Department Head and/or the Director of Graduate Studies. Alternatively, we recommend the student to consult the Department Head and/or the Director of Graduate Studies directly on those matters he or she considers impossible to broach with the advisor. Should a change of thesis advisors be required, it will be negotiated among the student, the involved faculty advisors, and the
Department Head or Director of Graduate Studies with the aim of serving the best interests of the student and the department. A change in thesis advisors must be approved by the Department Head.

**Grievance Procedures**

University policy strongly encourages all students who believe they have a dispute or conflict to use all appropriate avenues for informal resolution before initiating the Graduate College grievance process described herein. Students may seek advice about how to address their situation informally from their faculty advisers, the Department of Biochemistry Director of Graduate Studies, the Head of the Department of Biochemistry, The Associate Director of Graduate Studies of the School of Molecular and Cellular Biology, the Graduate College (see IV.A. below), the Office of the Dean of Students, and/or the Office of International Student Affairs before pursuing a formal Graduate College grievance. The Department of Biochemistry has chosen to use the Graduate College grievance policy for any formal graduate student grievances that arise in the unit. The Graduate College policy is available at [www.grad.illinois.edu/policies/ge_grievances](http://www.grad.illinois.edu/policies/ge_grievances)

**Leave Policy**

Graduate students are entitled to vacation on official University holidays (Labor Day, Thanksgiving, Christmas, New Years Day, Martin Luther King Day, Memorial Day, and Independence Day). Research and teaching assistants are also entitled to 13 days non-accruable sick leave each year. In the event of more protracted illness, leave without pay may be negotiated.

**Job Placement Sources**

**Biotechnology Center:**
Website: [www.biotec.uiuc.edu/cgi-bin/placement.pl](http://www.biotec.uiuc.edu/cgi-bin/placement.pl)
The Biotechnology Center maintains a Placement Office, room 108 Observatory (901 S. Mathews; Phone: 333-1378) which provides a central location for companies seeking candidates for positions in biologically related areas.

**Life Sciences:**
Website: [mcb.uiuc.edu/undergrad/careers.html](http://mcb.uiuc.edu/undergrad/careers.html)
The School of Life Sciences maintains a Career Services and Resources Room, located in room 127 Burrill Hall (333-6774) that provides information about biologically-related careers. Brochures, pamphlets, and books about specific biological careers are available as well as information on corporations, government employment opportunities, and graduate programs.
APPENDIX

I. List of approved advanced courses

II. Articles:

A. Standards for the Ph.D. Degree (TIBS 14, June 1989)

B. On Being a Scientist (Nat’l. Acad. Press, 1995)

C. Research Student and Supervisor (Council of Graduate Schools, 1990)

D. The Care and Maintenance of Your Adviser (Nature, vol 469)
### Appendix I. Advanced Elective Courses for Biochemistry Graduate Students*

<table>
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<tr>
<th>RUBRIC</th>
<th>Title</th>
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<tr>
<td>BIOC 445</td>
<td>Current Topics in Biochemistry</td>
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<td>BIOE 461/TAM 461</td>
<td>Cellular Biomechanics</td>
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<td>BIOE 502</td>
<td>Bioengineering Professionalism</td>
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<td>CB 467</td>
<td>Fund’l Pharm Disc &amp; Devel</td>
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<td>CHBE 473</td>
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<td>CHBE 474</td>
<td>Metabolic Biology</td>
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<td>CHBE/MCB 571</td>
<td>Bioinformatics</td>
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<tr>
<td>CHEM/BIOC 470</td>
<td>Computational Chemical Biology</td>
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<td>CHEM 512</td>
<td>Advanced Inorganic Chemistry</td>
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<td>CHEM 522</td>
<td>Experimental Spectroscopy</td>
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<td>CHEM 530</td>
<td>Structure &amp; Spectroscopy</td>
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<td>CHEM 532</td>
<td>Physical Organic Chemistry</td>
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<tr>
<td>CHEM 544</td>
<td>Statistical Thermodynamics</td>
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<tr>
<td>CHEM 572/MCB 553</td>
<td>Enzyme Reaction Mechanisms</td>
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<td>CHEM 573</td>
<td>Isotopically Labeled Compounds</td>
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<td>CHEM 574/MCB 554</td>
<td>Genomics, Proteomics, Bioinfo</td>
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<td>CHEM 578</td>
<td>Combinatorial Chemistry</td>
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<td>MCB 400</td>
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<td>MCB 419</td>
<td>Brain, Behavior &amp; Info Process</td>
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<td>Microbial Genetics</td>
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<td>MCB 424</td>
<td>Microbial Biochemistry</td>
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<td>Bacterial Pathogenesis</td>
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<td>Infection &amp; Immunity</td>
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<td>Computing in Molecular Biology</td>
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<td>MCB 480</td>
<td>Eukaryotic Cell Signaling</td>
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<td>Model Organisms &amp; Epigenetics</td>
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<td>Advanced Endocrinology</td>
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<td>MCB 528</td>
<td>Evolution in a Microbial World</td>
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<td>MCB 529</td>
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<td>PATH 519/MCB 561</td>
<td>Mechanisms Viral Pathogenesis</td>
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<td>PATH 544</td>
<td>Immunobiological Methods</td>
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<td>PHYS/BIOP 550</td>
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<td>VB 550</td>
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<td>VB 594</td>
<td>Veterinary Biosciences (Lab)</td>
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</table>

- other courses may be available. See Student Academic Affairs Office for updated list or approval.
Appendix II. Articles

A. Standards for the Ph.D. Degree (TIBS 14, June 1989)

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