

Curriculum of the Doctor of Philosophy (PhD) Degree

The awarding of a PhD degree requires the successful completion of formal courses and demonstration of accomplishments in basic research, qualifying exams, scientific writing, and formal presentations of research data. A student admitted to Graduate Studies for the PhD is considered an *aspirant* for the degree. After passing the Comprehensive Oral Exam, you will become a *candidate* for the PhD degree.

The general mission of graduate education for the PhD degrees within the Department of Molecular Biosciences is to enhance your academic knowledge base, teaching ability, communication ability, and in-depth basic research ability within a particular scientific area in the discipline.

Goals are specifically to:

1. Provide academic training in current knowledge in the field through graduate-level coursework.
2. Develop in-depth basic research ability in a particular area within the discipline, through basic bench research, which will advance the knowledge in the field and allow the student to operate as an independent investigator in applied or basic research.
3. Develop instructional skills through teaching undergraduates.
4. Develop substantive writing ability through completion of a dissertation and most probably manuscripts as well on the research performed.
5. Provide overall training which will:
 - a. Allow you to obtain further training in a post-doctoral program.
 - b. Qualify you for an instructional/undergraduate research position in a four-year college or university academic unit which offers both bachelor's and master's degrees.
 - c. Qualify you for a research scientist or postdoctoral position in industry.

General Requirements for all PhD Students

1. Completion of a core curriculum (see below).
2. Beginning second year, students will enroll in one of the following every semester:
 - a. BIOL 701 – Cellular and Molecular Proteins (CaMP) Seminar
 - b. BIOL 905 – Genetics of Development (GoD) Seminar
3. Two semesters (minimum) of graduate teaching are required.
4. By the beginning of the second year of graduate study, an Examination/Advisory Committee will be established. This committee will meet at least once per year. Annual committee meetings are mandatory for graduate students. The [Annual Report Form](#) with signatures of committee members will be sent to the Graduate Academic Advisor after each meeting.
5. Students will enroll in "Research Grant Proposal Preparation" (BIOL 925) in the fall semester of the second year.
6. In December of the second year students will have an Examination/Advisory Committee meeting. One week prior to this meeting you will submit your summary of specific aims (1-2

pages) to your Major Advisor and committee. During this meeting your specific aims will be discussed and approved, possibly after modification in light of the discussion. Once approved you will write the full proposal for the Oral Examination.

7. Students will submit a full draft of the proposal to your "readers" (this will be your Major Advisor, the Chair of your committee, and typically one other member) by the end of March.
8. The Comprehensive Oral Examination should be scheduled between May 1 and June 30.
9. Upon successful completion of formal coursework and research, candidates present, for evaluation by an Examination/Advisory Committee, a dissertation based on original research. The dissertation is presented and defended in a formal public lecture.
10. Students will complete the degree within seven years. Exceptions to this requirement require a recommendation for extension of study by the Department's Graduate Director and Chairperson, and approval by Graduate Studies.

Core Curriculum for all First Year PhD Students

1. BIOL 701 – Topics in Molecular Biosciences, MB Seminar (Fall and Spring)
2. BIOL 807 – Graduate Molecular Biosciences (Fall)
3. BIOL 817 – Rigor, Reproducibility, and Responsible Conduct in Research (Fall)
4. BIOL 985 – Laboratory Rotations (Fall and Spring)

Specific Course Requirements by PhD Degree

Biochemistry and Biophysics PhD

Each of the following courses (usually completed by the end of the second academic year):

BIOL 750 – Advanced Biochemistry

BIOL 918 – Modern Biochemical and Biophysical Methods

BIOL 925 – Research Grant Proposal (Fall of 2nd year)

BIOL 952 – Introduction to Molecular Modeling

BIOL 985 will be taken to reflect bench research. BIOL 999 will be taken once you pass your comprehensive orals exam (replacing BIOL 985). Your Graduate Examination/Advisory Committee may recommend that additional courses be taken.

Microbiology PhD

Each of the following five courses (usually completed by the end of the second academic year):

BIOL 811 – Advanced Molecular & Cellular Immunology

BIOL 812 – Mechanisms of Host Parasite Relationships

BIOL 814 – Advanced Molecular Virology

BIOL 815 – Advanced Molecular Genetics

And

BIOL 925 – Research Grant Proposal (Fall of 2nd year)

BIOL 985 will be taken to reflect bench research. BIOL 999 will be taken once you pass your comprehensive orals exam (replacing BIOL 985). Your Graduate Examination/Advisory Committee may recommend that additional courses be taken.

Molecular, Cellular and Developmental Biology PhD

Along with BIOL 925 (Fall of 2nd year), three graduate-level courses (numbered 600+) that total 9 credit hours. These are acceptable courses though there may be others. Consult with the DGS (Director of Graduate Studies).

BIOL 650 – Advanced Neurobiology (every Spring)

BIOL 688 – Molecular Biology of Cancer (every Fall)

BIOL 750 – Advanced Biochemistry (Spring of odd years)

BIOL 752 – Advanced Cell Biology (Fall of even years)

BIOL 754 – Brain Diseases & Neurological Disorders (every Spring)

BIOL 755 – Mechanisms of Development (Spring of even years)

BIOL 757 – Carcinogenesis & Cancer biology (Spring of odd years)

BIOL 772 – Gene Expression (Spring of odd years)

MCDB students can solicit advice from their current and future rotation advisors on courses that may be most beneficial to them. BIOL 985 will be taken to reflect bench research. BIOL 999 will be taken once you pass your comprehensive orals exam (replacing BIOL 985). Your Examination/Advisory Committee may recommend that additional courses be taken.

Oral Presentation Requirement for PhD Students

The ability to clearly communicate scientific results is an essential component of doctoral training. Beginning in the second year, graduate students are required to make an oral presentation of their data at least once every academic year. This will take place in either BIOL 701 – Cellular and Molecular Proteins (CaMP) Seminar or BIOL 905 – Genetics of Development (GoD) Seminar.

Research Proposal Requirement for PhD Students

Students will enroll in BIOL 925 – Research Grant Proposal Preparation in fall of the second year, and will complete and submit a research proposal at least two weeks prior to the Comprehensive Oral Exam in late spring. The proposal will follow the formatting guidelines of any federal agency (e.g., NSF, NIH), and should develop a research topic related to the general area of molecular biosciences. The

topic for the proposal will be determined by the Major Advisor, with input from the student and the Examination/Advisory Committee.

Comprehensive Oral Examination for PhD Students

Once PhD aspirants have successfully completed the required formal courses and research proposal requirement, the Comprehensive Oral Examination will be scheduled. This examination should be held from May 1 to June 30 of the second year of graduate study. Exceptions to this deadline require approval by the student's Examination/Advisory Committee. Your Examination Committee will give the exam. You will provide each committee member with a final copy of the proposal at least 2 weeks before the exam takes place. Your Major Advisor does not attend the exam but will instead submit a letter to the Chairperson of the committee, providing a detailed justification of your preparedness for the exam or your absence of qualifications for admission to PhD candidacy. After the exam and discussion of the Major Advisor's letter, committee members will decide whether or not you passed, thus becoming a candidate for the PhD degree. The Graduate Academic Advisor will forward this decision to the College Office of Graduate Affairs (COGA).

The exam must be scheduled with COGA at least two weeks before the exam actually takes place. This means that, after receiving approval from your Major Advisor and Examination Committee, you will notify the Graduate Academic Advisor for scheduling assistance (date, time, location) and so that they can complete the Progress to Degree (PTD) form to send to COGA in a timely manner.

During the exam you will defend your research proposal to the Examination Committee. The committee will also examine you with respect to more general subject areas (not necessarily related to the research proposal) associated with your research, formal coursework and scientific literature of all areas of the discipline. [Proficiency levels](#) on the orals exam are divided up into eight separate skill components.

Performance on the examination will be rated as "Satisfactory," or "Unsatisfactory" and this rating will be submitted to COGA. If you receive a rating of "Unsatisfactory", you may retake the exam a second time. Timing of the retake is at the discretion of the Examination Committee. Under no circumstances will you be allowed to take the Comprehensive Oral Examination more than twice. If you fail to receive a rating of "Satisfactory" after the second attempt, you will not be allowed to complete the PhD program. In this case, there is a possibility that you could switch to the MS program.

Final Oral Defense of PhD Dissertation

Once the Comprehensive Oral Exam has successfully been completed, your Examination/Advisory Committee comes back. This committee is responsible for giving you permission to begin writing of the dissertation. At least three members of this committee will be selected as dissertation readers (one of these being the Major Advisor). Once the final draft of the dissertation has been accepted and

approved by the Examination/Advisory Committee, the Final Dissertation Defense is scheduled with the Graduate Academic Advisor. All dissertation readers must be present at the exam.

Following the successful defense of dissertation, the committee will decide if the result was deemed “Satisfactory” or “Unsatisfactory.” This decision will be forwarded to COGA.

Be sure to consult your [Doctoral Degree Checklist](#) during the final stages of completing your degree.

Curriculum of the Masters of Science (MS) Degree

The general mission of graduate education for MS degrees in Molecular Biosciences based upon basic research, is to enhance your academic knowledge base, teaching ability, and communication ability, and to provide you with advanced, but less than, PhD-level, training in at-the-bench research within a particular scientific area. The specific missions within this framework are: (1) to provide academic training in current knowledge in the field through graduate-level coursework; (2) to develop research ability within a particular field, through basic at-the-bench-research following newly developed and existing (scientific literature) protocols; (3) to develop instructional skills through teaching undergraduate laboratories; (4) to develop writing ability through completion of a thesis or manuscript on the research performed; and, (5) to provide overall training which will allow you to obtain or advance to a more responsible and demanding research and/or teaching position (beyond entry-level) within academia (two-year or four-year undergraduate college) or industry.

The general mission of graduate education for MS degrees in Molecular Biosciences based upon library research of the literature is to enhance your academic knowledge base, teaching ability, and communication ability. This path of graduate level education is not intended to prepare you for at-the-bench research skills accomplished through basic research. Instead, the specific missions within this framework are: (1) to provide academic training in current knowledge through graduate-level coursework and library research of the literature that pertains to a defined problem; (2) to develop teaching skills through instruction of undergraduate laboratories; and, (3) to develop writing skills through completion of a library research thesis.

General Requirements for all MS Students

Please refer to each degree discipline area listed below to determine specific courses and requirements in conjunction with the following general requirements for the MS

1. A minimum of 30 hours of graduate credit.
2. A minimum of one laboratory rotation is required for each new graduate student.
3. Enrollment in CaMP Seminar (BIOL 701) or GoD Seminar (BIOL 905) every semester beginning second year.
4. Graduate Advisory Committee of 3 faculty members, including Major Advisor, will meet at least once annually.
5. A public defense of the master's thesis and examination by Graduate Advisory Committee.

6. Students will complete the degree within four years. Exceptions to this requirement require a recommendation for extension of study by the Department's Director of Graduate Studies and Chairperson, and approval by Graduate Studies.

Specific Course Requirements by MS Degree

Biochemistry and Biophysics MS

BIOL 750 – Advanced Biochemistry
BIOL 772 – Gene Expression
BIOL 804 – Scientific Integrity: Molecular Biosciences
BIOL 807 – Graduate Molecular Biosciences
BIOL 818 – Techniques in Molecular Biosciences
BIOL 899 – Master's Thesis
BIOL 901 – Graduate Seminar in Biochemistry (1 semester)

Microbiology MS

BIOL 804 – Scientific Integrity: Molecular Biosciences
BIOL 807 – Graduate Molecular Biosciences
BIOL 818 – Techniques in Molecular Biosciences
BIOL 899 – Master's Thesis

And three of the following courses:

BIOL 811 – Advanced Molecular & Cellular Immunology
BIOL 812 – Mechanisms of Host Parasite Relationships
BIOL 814 – Advanced Molecular Virology
BIOL 815 – Advanced Molecular Genetics

Molecular, Cellular and Developmental Biology MS

BIOL 752 – Cell Biology
BIOL 755 – Mechanisms of Development
BIOL 804 – Scientific Integrity: Molecular Biosciences
BIOL 807 – Graduate Molecular Biosciences
BIOL 818 – Techniques in Molecular Biosciences
BIOL 899 – Master's Thesis

And one of the following courses:

BIOL 753 – Advanced Genetics
BIOL 772 – Gene Expression

Masters Thesis Options

1. Write a thesis resulting from original research in the broad area of molecular biosciences.
2. Publish a research paper in a national, refereed journal. Acceptance of the paper for publication constitutes publication insofar as the conferral of degree is concerned. Two copies of the publication shall be filed with Graduate Studies as soon as they become available.
3. Write a thesis based upon library research (library thesis) of the literature on a given topic, approved by your Graduate Advisory Committee.

Final Oral Defense of Masters Thesis

Once the final draft of the thesis has been accepted and approved by the MS Graduate Advisory Committee, the Final Oral Defense is scheduled with the Graduate Academic Advisor. Your performance on the defense will be rated as “Satisfactory” or “Unsatisfactory” and this rating will be forwarded to the College Office of Graduate Affairs. If the rating is “Unsatisfactory,” you may be allowed to repeat the examination, with the recommendation of the Department. The repeat examination may not be scheduled sooner than three months after the first attempt. Under no circumstances will the student be allowed to take the Final Defense Examination more than twice. If a rating of “Satisfactory” is not achieved after the second attempt, you will not be allowed to continue in the MS program.

Theses are now being submitted [electronically](#).

General Graduate Program Information

Advising and First-Year Curriculum

New graduate students have a common fall semester curriculum, and in addition begin a series of rotations in research laboratories. Courses taken in the spring semester depend on the degree sought, and students can discuss an appropriate course schedule with the Director of Graduate Studies (DGS), Graduate Academic Advisor, and any member of the MB faculty. To guide your progress in the first year, your course work, teaching, and laboratory rotations will be evaluated by the Evaluation Committee. Once you have selected the lab for your dissertation research, your Major Advisor will advise you on your progress.

Laboratory Rotations and Finding a Research Lab Home

We will schedule in-person or virtual faculty talks so you can learn about research that piques your interest. Lab rotations will span Fall and early Spring, and we will share the schedule once logistics are set.

To reflect lab rotations, you will enroll in Advanced Study (BIOL 985) hours for fall and spring of your first year.

Completion of Rotations

Once lab rotations are completed, you will submit to the Graduate Academic Advisor a ranked list of faculty members with whom you would like to work. Every effort will be made to allow you to join your first-choice lab, although there must be mutual agreement between the student and faculty member. This mutual agreement will depend on your effort and performance during the rotation, the availability of continued financial support, the availability of space within the lab, and so on. If the first choice cannot be fulfilled, the second choice will be examined under the same constraints. Once a mutual agreement has been reached, new students will officially join research labs. The faculty member in charge of the lab will become your Major Advisor. Your Major Advisor will help advise you in selection of the best degree track to pursue. This decision is usually made by the beginning of your second year of study.

In rare instances a situation may arise such that you, your Major Advisor, or both desire a change in Major Advisor. Because it is a requirement that you have a Major Advisor and home lab in order to be a graduate student in good standing, we have a rather detailed [official policy](#) on this.

Enrollment Requirements

KU has [online enrollment](#). The Department of Molecular Biosciences has established a minimum credit hour level of enrollment that is appropriate for normal progress (i.e., course work and research effort) and which is representative of faculty time required for a student's work towards an advanced degree. These requirements will equal, and may exceed the minimum credit hour enrollment limit set by Graduate Studies. Departmental enrollment requirements are as follows:

PhD Enrollment Hours (Before the Comprehensive Oral Exam)

Students who have not yet passed the Comprehensive Oral Exam are expected to enroll in at least 6 credit hours each fall and spring semester and 3 credit hours each summer session.

PhD Enrollment Hours (18-Hour Post-Comp Rule)

After passing the Comprehensive Oral Exam, you must be continuously enrolled, including summer sessions, until all degree requirements are completed. According to Graduate Studies regulations, for the first 18 hours of post-comprehensive enrollment, you will enroll in a minimum of 6 credit hours per semester and 3 credit hours per summer session. You are welcome to enroll in more than 6 if you so choose. Be sure that you enroll in BIOL 999 for the remainder of your studies.

PhD Enrollment Hours (Fewer Than 6 Rule)

Students who have completed the 18-Hour Post-Comp requirement are now eligible to enroll in fewer than 6 hours. The Graduate Academic Advisor will let you know when this milestone has been achieved.

MS Enrollment Hours

Master's students are required to enroll in 9 hours each fall and spring semester. Those who have completed the required course work for their degrees must be continuously enrolled in the fall and spring semesters until they finish. While Graduate Studies does not require MS students to enroll for summer, if you have a GRA appointment for the summer, the Provost's Office requires that you enroll in 3 summer hours.

Academic Performance

Grading Systems

Graduate courses use the ABCDFP grading system or the SP, LP, NP performance criteria (SP = satisfactory progress, LP = limited progress, and NP = no progress). Advanced study, thesis, and dissertation research courses are graded with the latter.

Academic Standing

Only grades of A or B in graduate courses are considered satisfactory. If a grade of C or below is obtained, you will not receive graduate credit for this course and the course must be retaken. If your cumulative grade-point average falls below B (3.0 on a 4.0 scale), you are automatically placed on academic probation and will be required to raise your cumulative grade-point average to at least a B during the next semester. Grades such as P, S, U, SP, LP, and NP are omitted from these calculations.

Failure to meet this requirement may result in termination of your graduate study. In exceptional cases, the Graduate Admissions Committee (during your first year) or your Major Advisor and examination/advisory committee (once you have chosen your dissertation lab) can request that Graduate Studies extend your probation for one additional semester, after which time the minimum standards must be met. Regardless of these decisions, you will not be allowed to hold a GTA or GRA appointment until probationary status has been removed.

Probationary Students

Students who enter the program on probation (an undergraduate overall grade-point-average between 2.75 and 3.0) must maintain a B (3.0) cumulative grade point average their first semester. Any student who fails to meet this requirement will not be allowed to enroll the next semester. Alternatively, upon recommendation by the Graduate Admissions Committee the Chairperson may request of Graduate Studies that probation be extended for one additional semester. If, after the second semester, a student who was originally admitted under probationary status fails to maintain a B (3.0) cumulative grade point average, the student will be dismissed from the graduate program.

Graduate Assistantships

As long as you are a student in good standing, the department will provide a stipend for five years of graduate study. Unless you receive a graduate fellowship, you will be supported by the following mechanisms:

Graduate Teaching Assistantships (GTAs)

GTAs are provided on a semester-by-semester basis. Students holding these appointments will make arrangements with their Major Advisor for summer appointments. The specific GTA is set by departmental requirements and expertise of the student.

Graduate Research Assistantships (GRAs)

Individual faculty may have Graduate Research Assistantships (GRAs) available from grant funds. GRAs are appointed for one or two semesters at a time.

Health Insurance

The University of Kansas, together with the Kansas Board of Regents, offers health insurance coverage for eligible graduate students through United Healthcare Student Resources. MB graduate students who hold a 50% GTA/GRA appointment and meet the eligibility requirements qualify for KU's reduced premium [health insurance plan](#) offered through United Healthcare. Health insurance is mandatory for International students on an F-1, F-2 and J-1 visa and is automatically added after the student enrolls in classes. For more information visit the International Student Services webpage on [Insurance Requirements](#). Students enrolled in a graduate student health insurance plan should check the policy's terms of eligibility and enroll accordingly.

Tuition and Fees

If you hold a GTA slot, the University will pay all your tuition plus 3 graduate credit hours of campus fees. Please BE AWARE that you or your Major Advisor will be responsible for the balance of your campus fees.

If you hold a GRA slot, your Major Advisor is responsible for paying your tuition and fees. Please be sure to consult with your Major Advisor in advance of payment deadlines.

Teaching

Teaching is a necessary component of an advanced degree education. PhD graduate students are required to teach for at least two semesters. This requirement may be satisfied at any time during your tenure, but is usually fulfilled during the first year. You will be evaluated by the students in every class you teach. MS students may be required to teach for the duration of time in the graduate program.

Graduate Committees

It is your responsibility, in consultation with your Major Advisor, to identify faculty members to serve on your graduate committees following the rules outlined below. The Graduate Academic Advisor should always be notified when a committee is formed or changed.

Mandatory Annual Meetings

Annual committee meetings are mandatory, and you are responsible for scheduling a committee meeting once each year. Failure to satisfy this requirement may lead to you being considered [not in good academic standing](#) by the department. Following each committee meeting, a completed, signed Annual Report Form should be provided to the Graduate Academic Advisor.

Doctoral Students

PhD students should establish an examination/advisory committee as early as practicable at the start of their second academic year. A typical committee will consist of your major advisor, four tenured/tenure-track faculty from Molecular Biosciences, and a Graduate Studies Representative (informally known as the "outside member").

At least five committee members must be present for the comprehensive oral exam (the exam typically taken at the end of the second academic year) and for the final oral exam (the PhD defense). For each exam, one of these members must be the Graduate Studies Representative.

Your Major Advisor is the Chair of the doctoral examination/advisory committee except during progress towards the comprehensive oral exam. In Molecular Biosciences the Major Advisor does not attend the comprehensive oral exam; instead, the Chair of the committee for the comprehensive oral exam will be selected by its members.

The Graduate Studies Representative must be a tenured/tenure-track faculty member from a department other than Molecular Biosciences. The role of the Graduate Studies Representative is to ensure the examination process is professional and fair. Additionally, the Graduate Studies Representative can be on the faculty of KU Medical Center.

Additional information on requirements for a doctoral committee can be found in the Doctoral Student Oral Exam Committee Composition KU policy document, or you can speak with the MB Director of Graduate Studies or the MB Graduate Academic Advisor.

Master's Students

MA/MS students should establish an examination/advisory committee as soon as possible after entry to the master's program. MA/MS student oral exam committees should include at least three members, one of whom will be your Major Advisor. A majority of the committee should be tenured/tenure-track faculty from Molecular Biosciences. No Graduate Studies Representative is required.

Progress to Degree Forms

The Progress to Degree form (PTD) enables the University to track and collect vital information about students' progress to degree. Upon receiving information from you, the Graduate Academic Advisor will complete the necessary PTD form and forward it to the College for approval. Thus, it is very important that you contact the Graduate Academic Advisor when you do any of the following: change degree status, form a committee, hold a committee meeting, schedule an exam, schedule a seminar, schedule a defense, or change degree program. If you are not sure about something, please check with the Graduate Academic Advisor.

Seminars

All graduate students will be expected to attend the weekly Departmental Seminar. These are generally speakers from outside the University. It is scheduled every Monday at 3:30 p.m. in 1005 Haworth Hall (unless otherwise noted).

After your first year, all graduate students will also be required to attend and enroll in ONE of the following specialized seminars:

BIOL 701 – Cellular and Molecular Proteins (CaMP)

Website

We maintain a [departmental website](#) where news is posted monthly. We are proud of our students and we want to showcase them so anytime you have an update to your [profile](#), please let the Graduate Academic Advisor know. There is also a dedicated section [for current students](#) that houses a number of useful documents.