Master of Science in Medical Sciences Program
2016-2017 Handbook
Welcome to the MS in Medical Sciences program!

The mission of the MS in Medical Sciences program is to advance the knowledge of our students and facilitate efforts towards realizing their career goals. We are committed to your success and preparing you for today’s job market.

The next 18-24 months are going to go by quickly! In this document you will find everything you need to successfully navigate the University of Kentucky, including guidelines and policies. There are also direct links to forms and university web-sites where you can find additional information. As this information is constantly being updated, please also refer to the regulations and policies found in the University of Kentucky Graduate School Bulletin, which inform our procedures. And of course, if something isn’t listed here, please do not hesitate to reach out directly to me (regarding academic questions) or the Office of Biomedical Education (regarding administrative questions).

We look forward to working with you!

Sincerely,

Joe E. Springer, Ph.D.
Director of Graduate Studies
Books and Materials
Any required booklists are provided by the faculty on or before the first day of each semester. Most textbooks will be on order at the University of Kentucky Bookstore or Kennedy's Wildcat Den; however, many may be found at discounted sites such as Amazon.com and Half.com. Faculty members who require pre-reading will communicate with students in advance so that materials are made available.

Calendar
The University of Kentucky academic calendar can be found on-line on the Registrar’s web-site. Important deadlines regarding registration, tuition payments, and graduation paperwork are on this calendar. Any changes to individual class schedules will be communicated directly to you by your professors.

Communication & Email
While you are a student at University of Kentucky, you must maintain an active UK e-mail account. E-mail is the university’s mechanism for official communication with students, and UK expects that students will read official e-mail in a timely fashion. All communication from students to university administration should be conducted with a UK e-mail account. If a non-UK e-mail account is your primary email, you may choose to forward your UK e-mail to your primary e-mail account. However, you will still need to maintain the UK account by periodically updating your password. For more information on UK e-mail, you may visit the UK Analytics & Technologies (UKAT) web-site.

Financial Aid
Students who require financial aid to pay tuition should apply before June 30 to secure loans in time for payment for the fall semester tuition. More information on financial aid is available from UK’s Student Financial Aid office at (859) 257-3172.

Fitness Facilities
Any student considered full-time by the Registrar may use UK’s fitness facilities free of charge. The Johnson Recreation Center is the student fitness facility.

MSMS Office Hours
The Office of Biomedical Education is open from 8:00-4:30 Monday through Friday. Dr. Joe Springer holds office hours by appointment.

Parking
Parking permits are required to park on-campus during class days. Students living off-campus who wish to drive to class may purchase a Stadium (K) permit. This costs $272 for the full 2016-2017 school year. Students living on-campus have the option to purchase a Residential (R) permit for $296. Passes may be purchased for single semesters as well. Information on rates and parking locations can be found here.
Student Health Records/ Insurance

University Health Services provides medical treatment for full- and part-time students. The university also has a student health insurance plan (voluntary) that provides benefits for sickness and injury. The University of Kentucky requires all international students and their dependents to have health insurance.

Study Rooms

If you need to meet with a group outside of class, there are several options available. There are study rooms available on a first-come, first-serve, basis at the Young Library and the Science Library. There are 22 group study rooms in William T. Young Library and 6 study rooms at the Science Library that are available for use by UK-affiliated groups only (some of which are limited to weekends and after 5:00 PM on weekdays). You may check out a study room at the Circulation Desk. You will need at least 2 of your group present and a valid UK student ID to sign out a room. Rooms at the Young Library can accommodate 8-10 people, and rooms at the Science Library can seat 4-6. Each space is equipped with data connections and a dry-erase board. Some also have a Mediascape unit. Dry-erase markers and erasers are available for check-out at the Circulation Desk.

Tuition Payments

The program tuition fee for the 2015-2016 academic year is $11,652 for residents and $26,154 for non-residents. Tuition includes two (2) semesters of instruction; additional fees may apply to specific courses. You can view and print your bill through myUK.

Tuition payments are due at the start of each term on the 22nd of the month for which the charges were billed (typically August, January, and May). Students can pay tuition on-line through myUK. If you have issues, please contact UKAT. They may also pay in person or by mail with a check or money order.

Unpaid Tuition

Students with unpaid tuition balances will be charged a late payment fee and the Office of Student Accounts will place a registration hold on myUK, and students will be prevented from registering for future courses. Tuition must be paid directly to Student Accounts. OBE staff does not accept tuition or facilitate payment arrangements.

WildCards

MSMS students must have their identification photographs taken in the WildCard ID Office at Bowman's Den. WildCards are required to use the library, obtain student rates at athletic events, plays, and concerts, as well as to use student facilities such as the fitness and aquatic center. Each student's initial WildCard costs $15, and the replacement fee for lost IDs is $30.

Students engaged in research may be required to access various restricted areas. In this case, they should contact the Administrator or DGS of the department or center in which the research is being conducted to obtain a Medical Center ID badge.
Attendance and Absences
Students are expected to attend all classes. Attendance is extremely important for learning, participating, and gaining the most value from your graduate experience. Faculty are responsible for monitoring attendance. Excessive absences are grounds for academic probation or dismissal from the program. Occasionally, work-related travel or an emergency makes absence from class necessary. Individual professors have their own policies regarding absences from their classes, and MSMS students should consult with the professor (not the program staff) prior to the absence to make arrangements for completing missed work. In most cases, grades are affected by participation and attendance.

Students are considered both trainees and employees. Most departments consider that students have approximately four (4) weeks total vacation time each calendar year, consistent with vacation allocations for other employees. Any vacation time taken during the holiday break for Christmas and New Year’s, during spring break, and vacation days away from campus at other times are included in this four-week allocation. Generally, students are expected to keep a schedule similar to the UK staff calendar (and not the academic calendar) and to be on campus on a continuing basis during regular work hours throughout the year. Students should also be aware that the demands of research protocols or presentations may require work on holidays, weekends, or evenings.

Classroom Etiquette
While taking a class in the MSMS program, students must behave in a way that demonstrates respect for faculty and students, and that supports the learning environment of all students. Therefore, laptops should be used only for tasks directly related to the class. During class time, computers, cellular phones, and other internet-enabled devices may not be used to check e-mail, browse the Internet, or conduct work for other classes. Such behavior distracts other students and interferes with the faculty member’s ability to teach. At their discretion, faculty may issue additional restrictions on the use of laptops and other electronic devices.

Classroom Procedures
Instructors establish their own classroom protocols concerning grade requirements, including class participation and group projects, the use of computers and other technology in the classroom, and attendance.

Degree Completion Deadline
All students must complete all requirements for the master’s degree within six years of the date of their initial registration in the MSMS Program and are subject to meeting new program requirements should they change after this deadline. Students may petition for an extension of up to four years in order to complete the master’s degree requirements if they have legitimate cause for not completing the degree within the six year limit. Extensions up to two years may be approved by the Dean of the Graduate School or designate. Requests for extensions longer than two years must be considered by the Graduate Council. Requests will be initiated by the Director of Graduate Studies at the petitioner's request and submitted to the Senior Associate Dean.

Grading
MSMS students are graded on an incremental system of A, B, C, and E.
Graduation
University of Kentucky hosts university-wide commencement ceremonies each December and May for students who are interested in walking. For the 2016-2017 academic year, these ceremonies will be on Friday, December 16, 2016, and Sunday, May 7, 2017. MSMS students who will complete their degrees that semester are eligible to participate; however, students must rent their own regalia. Because the commencement ceremony occurs before final grades are verified, students will not receive their diplomas at the ceremony. Diplomas are mailed to eligible graduates within two months of graduation to the student's permanent address so, prior to graduation, make sure all of your records are up to date and reflect your post-graduation address.

Grievance Procedures
Concerns regarding grades, performance, or workload should be brought to the attention of the faculty member leading the course, who makes the final determination regarding these matters. Concerns regarding any other matter should be brought to the attention of the Director of Graduate Studies.

Honor Code
MSMS students will operate under University of Kentucky’s Code of Student Conduct that governs exams, papers, class assignments, and other coursework. University policy requires that all registered students be aware of these principles.

Incompletes
A grade of "I" may be assigned to a graduate student if a part of the work of a course remains undone and if there is a reasonable possibility that a passing grade will result from completion of the work. All "I" grades must be replaced by a regular final letter grade within 12 months of the end of the academic term in which the "I" grade was awarded or prior to the student's graduation, whichever occurs first. If an "I" grade has not been replaced within the allowable period, the University Registrar shall change the "I" grade to a grade of "E" on the student's permanent academic record and adjust the student's grade-point standing accordingly, unless otherwise approved because of exceptional circumstances by the Dean of the Graduate School on recommendation of the DGS in the student's program. In exceptional circumstances, the Dean of the Graduate School will consider one semester extensions of "I" grades beyond the 12 month period only (the combined summer terms count as one semester). In order to request the extension, the student must obtain the recommendation of both the course instructor and the DGS in the student’s program and complete this form. In addition, the instructor must specify the remaining work necessary for the satisfaction of the course requirements, and the time frame over which this work will be completed. All work must be completed, and the grade assigned by the last day of final exams for the semester in which the extension is granted.
Late Assignments
Late assignments are accepted only with the advance permission of the instructor. Some instructors do not accept late work. Any revised due date(s) must be determined by the instructor and the student, and it is the student’s responsibility to meet any revised date(s). Work submitted late may be subject to a grade reduction.

Probation
The Graduate School will place a student on academic probation if their GPA average falls below 3.00 after completing 12 or more credit hours. A student must restore their GPA to 3.00 or above within the next 9 credit hours. Otherwise, they will be dismissed by the Graduate School but may apply for readmission at a later date. Students on academic probation are ineligible for fellowships, tuition scholarships, and graduation.

The assignment of probation, which is notice that progress toward the degree is unsatisfactory, is noted on the student’s transcript.

If you receive notice that you are on academic probation, be sure to schedule a meeting with the Director of Graduate Studies to explore reasons for your unsatisfactory performance and discuss what you might do differently in order to raise your performance level.

Research
All students are encouraged to have at least one semester of biomedical research experience with a faculty member in one of the Departments/Centers affiliated with the MSMS program. Students should identify an area of interest and then explore opportunities with faculty members in that area. This can be accomplished by examining the research programs of the different faculty in the Departments/Centers of interest. Students in the Plan B option (see below) should only take 3 hours of research for credit. Typically, a three (3) credit hour research course would require approximately six (6) hours of dedicated time per week when working on a Plan B literature based research report (see below and FAQ pages). However, students wishing to participate in “hands on” research projects should be expected to spend more time working on their project. The time commitment will be based on the type of project and expectations of the research mentor. Most all students conduct their research project during Summer Session II.
Course Registration
Students will register for all courses using myUK, UK’s web-based student enterprise system. All students should consult the Academic Calendar in the registrar’s office to determine their specific registration window. Students enrolling in MSMS classes should be able to select the courses they wish to take without issues. Failure to register during the priority registration window will require late registration and a late fee.

Learning Management System
The University’s Course Management System (CMS), powered by Canvas, is a web-based course environment that allows students to view course materials, submit assignments and tests, view grades, and share documents, calendars, and sites.

Not all faculty will use Canvas. Please check with your faculty member or teaching assistant for questions about your course Canvas site. If you do not see your course listed, this means your instructor has not yet made the course site available or is not using Canvas for the course.

Library
The University of Kentucky has several libraries on-campus designed to meet students' varying needs. As a UK student, you have access to all libraries and to electronic resources available remotely using your LinkBlue ID. Materials may also be accessed through interlibrary loan, which provides a daily delivery of books and materials to UK’s campus and allows MSMS students who work in that area to pick up materials at their convenience.

myUK
myUK provides student web access to UK’s Student Services. Through myUK, students can register for classes, pay tuition, order transcripts, print enrollment verifications and grade reports, see financial aid and student account information, update address and telephone numbers, check course enrollment levels, and more. If you need assistance with myUK, call (859) 218-HELP.

Safety and Research Training
MSMS students who participate in laboratory research must complete the basic safety training required for biomedical research at UK. Students and faculty research mentors must review any additional safety or research training requirements prior to engaging in specific lab activities.

Laboratory accidents should be reported immediately to the faculty mentor or appropriate lab personnel to determine a course of action. Non-life threatening accidents requiring medical attention need to be reported first to Worker’s Care (1-800-440-6285). The injured employee (including graduate students) must go to UK Employee Health (part of University Health Services on Limestone) in the Kentucky Clinic for medical treatment.
Services for Students with Disabilities
University of Kentucky and the Disability Resource Center are committed to providing a supportive and challenging environment for all students with disabilities who attend the University. Additionally, the University and the Disability Resource Center work to provide students with disabilities a learning and community environment that affords them full participation, equal access, and reasonable accommodation of their disabilities.

The University is obligated to make a reasonable accommodation only for known limitations of otherwise qualified students with disabilities. In other words, students with disabilities must register with the Disability Resource Center in order to qualify for reasonable accommodations.

Study Groups
The MSMS program fosters a collaborative learning environment. Students are encouraged to form small study groups when it would be helpful to do so. Study groups are voluntary in nature.

Technical Help
The MSMS Program requires that students use the University of Kentucky LinkBlue IDs and e-mail addresses that are assigned to them. Should you have questions or problems with your LinkBlue ID or e-mail, you may contact UKAT Support Center: (859) 218-HELP (4357) or at 218help@uky.edu. You may also visit a support center at Tech Help @ the Hub in the basement of William T. Young Library.
Alumni Services
As an alumnus/a of University of Kentucky, you will be eligible to join the university's Alumni Association by applying here. This membership grants you exclusive benefits such as access to local UK alumni clubs and events and discounted access to athletic facilities. Other benefits of a UK Alumni Association card include discounts on insurance, testing services, merchandise, and travel.

Career Services
The James W. Stuckert Career Center offers free career counseling catered specifically to graduate students. Career counseling is a confidential and supportive process through which you and your counselor work together to explore career options and make career decisions. You will work at your own pace on the parts of the career planning process appropriate to your needs. Career counseling can include discussing your strengths, areas of growth, and challenges.

Wildcat CareerLink allows you to search an online database to connect with alumni who want to share their career knowledge and experiences. With Wildcat CareerLink, you can access on-line resume and cover letter writing tools, find career events and job fairs, and view employer profiles.

Facebook
The Office of Biomedical Education maintains a Facebook page for all students and alumni. Throughout the year, OBE staff and other members of the group will post information about jobs and events at the university. To follow these posts, like the University of Kentucky Office of Biomedical Education on Facebook.
How do I apply for my degree?

Early in the semester in which you intend to graduate log on to myUK, navigate through Student Services to myRecords, and then select Graduate Degree Application. Applications are due 30 days after the beginning of the semester (15 days for 2nd summer session).

I’m a Plan A student and ready to defend my thesis. Now what?

Plan A requires defense of a written formal master’s thesis according to the guidelines established by the Graduate School. The complete thesis must be provided to the committee at least two weeks prior to the defense date. The defense follows an oral presentation of the thesis research and is conducted by a committee of at least three faculty members. Typically the student's advisor chairs the committee.

At least two weeks prior to the examination date that has been approved by your committee, submit a final copy of the thesis to your committee and the DGS of the MSMS program.

The final, accepted thesis document must be submitted to the Graduate School no later than 60 days following the date of your defense. You will not have the entire 60 days if you defend late in the semester and need to graduate that semester. Prior to the final submission you must have your thesis reviewed by the Graduate School to check for correct formatting. This process takes about 48 hours and may take longer during peak periods, especially towards the end of the semester. For more information on preparation and formatting of electronic theses, follow this link.

You should submit a request for a Final Master’s Examination no later than 2 weeks prior to the last day of classes. Conduct a review of your transcript to insure you don’t have any missing grades; I grades and your GPA is 3.00 or higher. Graduate School policy will not allow you to sit for the exam if you have unresolved academic issues.

The defense of your thesis must take place no later than eight days prior to the last day of classes of the semester in which the student expects to graduate. Final examinations may not be scheduled during the period between semesters or between the end of the eight-week summer session and the beginning of the fall semester. Consult the Academic Calendar for specific deadlines.

I’m a Plan B student and ready to schedule my final examination. Now what?

Plan B does not have a formal written thesis but does require a final master’s exam that involves a written document covering a research project or, if no research is conducted, a research paper based on a student’s area of specialization. The report should be at least 12-15 double spaced pages in length (not including title page, figures, and references).

The general format of the actual Plan B final master’s exam is up to the student’s advisory committee. For example, most students generate a PowerPoint-style presentation that will serve as the basis for questioning about the research report. The research report must be provided to the committee at least two weeks prior to the date of the exam. The presentation would include the hypothesis to be tested, the methodology used, the results of the study, interpretation of the results, and future directions. Students who do not conduct any research would be asked to write a research proposal in an area of interest and their final exam would follow the same guidelines and format as above.
At least 2 weeks prior to the examination date that has been approved by your committee, submit a final draft of your report to each committee member and to the DGS of the MSMS program. You should submit a request for a Final Master’s Examination. Conduct a review of your transcript to insure you don’t have any missing grades; I grades and your GPA is 3.00 or higher. Graduate School policy will not allow you to sit for the exam if you have unresolved academic issues.

The final examination must be scheduled no later than 2 weeks prior to the last day of classes, and take place no later than eight days prior to the last day of classes of the semester in which the student expects to graduate. Final examinations may not be scheduled during the period between semesters or between the end of the eight-week summer session and the beginning of the fall semester. Consult the Academic Calendar for deadlines.

**How should I set up my thesis defense/final exam committee?**

The make-up of your committee is based, in part, on the research area of interest. You need a minimum of three (3) faculty members on your committee and should consult with your research mentor to identify at least two additional faculty. At least two of the three committee members (including the chair or co-chair) must be members of the graduate faculty, and at least one must be have full member status. Although faculty outside of the College of Medicine are able to serve on your committee (when appropriate), at least one committee member must be from the College of Medicine.

*Note:* Students are asked to share this handbook with their research mentor/committee to inform them of expectations and procedures.

**Can I still take my master’s final exam if I have completed the required 30 credit hours but my GPA is below 3.0 and/or I am on academic probation?**

You may still take your final exam, but you are unable to receive your degree until your GPA is above 3.0 and/or you are no longer on academic probation.

**What happens if I complete the required 30 credit hours but did not take my final exam?**

You are currently not required to be enrolled in the semester in which you take your final exam. For example, you may schedule your final exam during the semester following completion of your 30 credit hours. This requires that you contact the DGS to ensure your application for a degree is carried forward and that you fill out a hard copy request to schedule a master’s final exam.

**I am on the Plan B option. How do I go about finding a research mentor to complete the 3 credit hour research requirement?**

Typically, the research mentor serves as the chair of your master’s final exam committee. The best approach is to look for a faculty member who has research/teaching expertise in an area of your interest. You should set up a meeting to talk with the faculty member and discuss their potential role as a mentor for your research project.

**How do I remove an advisor hold on my account so I can register?**

You should contact the Office of Biomedical Education with your issue and student ID number.
Curriculum

The plan of study for the MSMS program consists of an eight (8) credit hour core curriculum and a recommended course of study based on career tracks. Additional coursework to fulfill the MSMS degree requirement is selected from courses offered in the basic and biomedical science programs in the College of Medicine and other colleges. Students will work with their mentor to design a career-focused curriculum along discipline specific tracks that target the needs, training, and career goals of each student (e.g., medical school, dental school, doctoral, pharmaceutical industry, laboratory technician, etc.).

Students entering the MSMS program may choose either a thesis option (Plan A, see Addendum 1) requiring 24 hours of graduate level coursework AND at least six hours of masters research (XXX 768), or a non-thesis option (Plan B, see Addendum 2) requiring 30 hours of graduate level coursework. For both Plan A and Plan B, 50% of the coursework must be at the 600 level or above and two-thirds of the coursework must be in formally organized courses.

Worksheets describing the Graduate School and MSMS program degree requirements, as well as steps for each plan are provided to all students and copies are included as attachments to this handbook. Each student is responsible for ensuring they adhere to the guidelines, timetables, and submission deadlines related to their specific plan option as described in the worksheets.

The Plan A thesis option generally serves a limited and well-defined population. Often students in Plan A are either lab technicians who are already engaged in research or doctoral students who have completed part of their dissertation research before transferring to the masters’ degree program.

Students in the Plan A thesis option should register for Master’s Thesis Research (XXX 768) during the semester in which they conduct their research project. Students will need to be registered for XXX 748 once they complete six credit hours of the XXX 768. Registration in XXX 748 ensures that a student is considered to be in full-time status for the purposes of financial aid and loan deferments. The DGS of the MSMS program submits the request for registration in XXX 748 and will forward this to the Graduate School once notified by the student.

Plan A requires defense of a written formal master’s thesis according to the guidelines established by the Graduate School. The complete thesis must be provided to the committee at least two weeks prior to the defense date. The defense follows an oral presentation of the thesis research and is conducted by a committee of at least three faculty members. Typically the student’s advisor chairs the committee.

The final, accepted thesis document must be submitted to the Graduate School no later than 60 days following the date of your defense. You will not have the entire 60 days if you defend late in the semester and need to graduate that semester (check the Academic Calendar for deadlines). Prior to the final submission you must have your thesis reviewed by the Graduate School to check for correct formatting. This process takes about 48 hours and may take longer during peak periods, especially towards the end of the semester.

Students opting to take the Plan B non-thesis route should register for no more than 3 credit hours of research. The actual course number depends on the Department designation (for example, Research in Anatomy is ANA 790, while Research in Biochemistry is BCH 640).
However, students on the Plan B option should not sign up for XXX 768 Research Credit Master’s Degree as this is for Plan A students only.

Plan B does not have a formal written thesis but does require a final master’s exam that involves a written document covering their research project or, if no research is conducted, a research paper based on a student’s area of specialization. The report should be at least 12-15 double spaced pages in length (not including title page, figures, and references). The general format of the actual Plan B final master’s exam is up to the student’s advisory committee. For example, the committee may require the student to prepare a PowerPoint-style presentation that will serve as the basis for questioning about the research report. The research report (or paper/proposal- see below) must be provided to the committee at least two weeks prior to the date of the exam. The presentation would include the hypothesis to be tested, the methodology used, the results of the study, interpretation of the results, and future directions. Students who do not conduct any research would be asked to write a research proposal in an area of interest and their final exam would follow the same guidelines and format as above.

Graduate School policy states that students will not be allowed to sit for a thesis defense or final exam if there are unresolved academic issues. Therefore, you need to check your transcript to ensure there are no missing grades or coursework in which you received a grade of “I”. In addition, you must be in good academic standing (your GPA is 3.00 or higher).

**Faculty Advisor, Research Mentor, and Committee**

All MSMS students will be required to have an advisor who works with the student to develop their individualized curriculum and overall plan. The DGS of the MSMS program may fulfill this obligation or students may elect to identify a faculty/DGS in the student’s area of interest/specialization (the vast majority of students continue to rely on the MSMS program DGS).

Students participating in the Plan A thesis option will work very closely with their research mentor throughout their entire time in the program. Students pursuing the Plan B non-thesis option will identify a research mentor based on their area of interest. In both cases, the research mentor will help establish the student’s committee that will oversee the student’s progress (in the case of the Plan A thesis option) and serve as the thesis (Plan A) or non-thesis (Plan B) final examination committee. A worksheet and checklist for either Plan A or Plan B may be found at the end of this handbook.

*Note*: Students are asked to share this handbook with their research mentor/committee to inform them of expectations and procedures.

All students will be required to meet with their advisory committee at least once a year to review the student’s progress. The results of this meeting will be communicated to the student in writing with a copy sent to the DGS, and the student’s committee will address any deficiencies in a student’s academic background.
Core Courses

**IBS 602/BCH 608: Molecular Biology and Genetics**
An introductory graduate-level biochemistry course focused on the cellular mechanisms that underlie the regulated expression of genes, including transcription and translation, as well as basic mechanisms of DNA replication/repair and recombination. Genetic engineering and other experimental approaches critical to molecular biology research will be reviewed. **Prerequisites:** CHE 105, 107, 230, 232; BIO 150, 152 (or equivalents)

**IBS 606: Physiological Communications**
An introductory graduate level course that considers the function of the mammalian organism from a perspective ranging from cells to organs, with an emphasis on physiological communication between organ systems. The course is organized into 3 sections that include: (a) overview of basic physiological mechanisms maintaining homeostasis and mechanisms of endocrine communication via the bloodstream, (b) mechanisms of cell to cell communication by the immune system, and (c) mechanisms of neural communication. **Prerequisites:** BCH 401G; IBS 602

**TOX 600: Ethics in Scientific Research**
Overview of good laboratory practices as the basis of good scientific research, and overview of quality assurance and appropriate practices in data analysis and data interpretation. Ethics of human and animal experimentation; the concepts of data and intellectual property, their ownership and access to them. **Prerequisites:** Research experience and consent of instructor.

Elective Courses

Examples of recommended courses that provide advanced scientific training are listed below and based on prerequisites that are consistent with different professional degree programs and areas of specialization.

For example, students planning to pursue an advanced degree in biomedical research, such as the IBS program at UK, would benefit from taking IBS 601/BCH 607 Biomolecules and Metabolism. The Fundamentals of Biochemistry course (BCH 401G) would provide sufficient exposure and background material for students wishing to pursue a non-research based health-related professional degree program. Many, if not all, dental schools are now requiring microbiology as a prerequisite and students wishing to pursue this career path should consider taking MI 495G Bacterial Pathogens or MI 494G Immunobiology. A student pursuing a career in the pharmaceutical industry would want to consider taking Principles of Drug Action (PHA 621) and Molecular Targets and Therapeutics (PHA 622).

Fall Semester 2016

**Anatomy**

**ANA 600: Seminar in Anatomy**
A weekly seminar devoted to presentation and discussion of classic and new research in the field. May be repeated to a maximum of four credits. **Prerequisite:** Admission to the anatomy graduate program or permission of the course director.
ANA 605: Neurobiology of CNS Injury and Repair
The objective of the course will be to provide a general overview of the current state of knowledge concerning the pathophysiology and therapeutic approaches to central nervous system injury. The course will provide a strong working background concerning the issues, techniques and frontiers of neurotrauma therapeutic discovery research aimed at reducing acute post-traumatic neurodegeneration in the injured brain or spinal cord or enabling regeneration and repair. This course is a graduate level course intended for students who are in their second or subsequent years of graduate study and who are pursuing focused research training in neurotrauma research.
Prerequisite: Permission of instructor.

ANA 612: Biology of Aging (Crosslisted as PGY 612)
A multidisciplinary discussion of how the process of aging affects biological systems. Coverage will be quite broad and includes topics such as subcellular and cellular aging, genetics, immunology, anatomy and physiology, animal model of aging, etc.
Prerequisite: Permission of instructor.

ANA 631: Advanced Human Anatomy
The objective of this course is to meet individual student needs for increased knowledge in particular areas of gross human morphology. Investigations of problems involving gross morphology will be carried out. One or several defined areas of the body will be studied in considerable detail by dissection, by intensive use of the pertinent literature, by the use of visual aids, prospected materials and other appropriate learning aids.
Prerequisite: A background in gross human anatomy equivalent to a medical school course in regional anatomy and consent of course director and/or Director of Graduate Studies in Anatomy and Neurobiology.

ANA 638: Developmental Neurobiology (Crosslisted as PGY 638)
An explanation of the processes which contribute to the development of the nervous system. Neurophysiological, cell biological and molecular approaches to cell differentiation, neuronal pathfinding and synapse formation and stabilization will be explored and discussed. Examples will be drawn from both vertebrate and invertebrate preparations.
Prerequisite: BIO 535 or permission of instructor.

ANA 790: Research in Anatomy
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 12 credits.
Prerequisite: Permission of instructor.

Biochemistry

BCH 401G: Fundamentals of Biochemistry
Descriptive chemistry of amino acids and proteins, carbohydrates, lipids, and nucleic acids. Discussion of structure and function; metabolism and bioenergetics; and biological information flow. At the undergraduate level, understanding is demonstrated through hour examinations; at the graduate level, understanding is demonstrated through hour examinations and a brief paper. Lecture, three hours; one optional conference.
Prerequisite: CHE 107, 236; BIO 152; or equivalents.
BCH 607: Biomolecules and Metabolism
An introductory graduate-level biochemistry course designed to provide a basic knowledge of molecular and biochemical principles necessary for advanced graduate study. Protein structure and function, enzyme catalysis, the generation and storage of metabolic energy, amino acid, nucleotide, and lipid metabolism and biological membranes and transport will be covered.
Prerequisite: CHE 105, 107, 230, 232; BIO 150, 152; or equivalents.

BCH 612: Structure and Function of Proteins/Enzyme
Primarily a lecture course devoted to the relationship of the structure of protein molecules to their biological roles. Proteins will be discussed in terms of their size, shape, conformation, primary structure, catalytic mechanism and regulatory properties.
Prerequisite: BCH 401G, 502, or 811; CHE 444G; or permission of instructor.

BCH 618: Student Seminar
A weekly seminar, required of all students majoring in biochemistry, devoted to discussions of areas not covered in other courses and to recent developments in the field. May be repeated to a maximum of five credits.

BCH 625: Scientific Communications
To be useful, scientific research needs to be explained clearly to others--to colleagues, to administrators, to foundations and governmental bodies, and to the public. This course will give students the tools to effectively present their data, their ideas, and themselves to the scientific community. Through a series of directed exercises the students will learn how to write an abstract, a scientific paper, and a grant, and to prepare a poster and to give an oral presentation. The class will draw examples, topics, and exercises from current literature.

BCH 640: Research in Biochemistry
Individualized laboratory and research experience under the supervision of a faculty member.
Prerequisite: Permission of instructor.

Behavioral Science
BSC 773: Psychosocial Oncology
This course will introduce the student to the field of psychosocial oncology. Historical and recent developments in the application of behavioral science knowledge and methodology to the understanding and treatment of cancer and the cancer patient will be examined. The role of psychosocial factors in the etiology, prevention, and treatment of cancer will be explored. Emphasis will be placed upon the interaction of biological, psychological, and social factors throughout the course of cancer.

BSC 778: Behavioral Factors Selected Diseases
An exploration of behavioral science concepts which bear on various physical illnesses. The perspective of the course is interdisciplinary, using concepts from the various behavioral science disciplines.
Prerequisite: Permission of instructor.

BSC 788: Drug Abuse: Contemporary Theories and Issues
This course is designed to familiarize students with major concepts and current issues in the field of substance abuse research.
BSC 790: Research in Medical Behavioral Sciences
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 12 credits.
**Prerequisite:** Permission of instructor.

**Microbiology, Immunology, and Molecular Genetics**
MI 494G: Immunobiology
A survey of theories and mechanisms of immunity, including: nature of antigens and antibodies, antigen-antibody reactions, immunocompetent cells, immunogenetics, allergic reactions, tumor immunology and transplantation immunology.
**Prerequisite:** BCH 401G; BIO 208 or BIO 308; or permission of the instructor.

MI 772: Seminar In Microbiology
Review of current literature in microbiology; presentation of papers on work in progress in the department or on assigned topics; reports on meetings of national and international scientific and professional societies and symposia.

MI 798: Research in Microbiology
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 24 credits.
**Prerequisite:** Permission of instructor.

**Pharmacology**
PHA 422G: Pharmacology of Treating Human Disease
This course will provide students with a fundamental understanding of the actions of drugs most commonly used in the treatment of the major human diseases, drugs of abuse, and those used in sports to enhance performance. This course is geared toward the pre-professional and others interested in a career in health care and research.
**Prerequisite:** BIO 315, 350

PHA 621: Principles of Drug Action
The objective of this course is to familiarize graduate students with the principles and mechanisms of drug action in biochemical and physiological systems. Students will discuss the quantitative approaches to assessing drug responses, metabolism and toxicity.
**Prerequisite:** Permission of instructor.

PHA 750: Research in Pharmacology
May be repeated to a maximum of 15 credits.

PHA 770: Seminar in Pharmacology
May be repeated indefinitely.
Physiology
PGY 412G: Principles of Human Physiology
The objective of this course is to provide the basic physiological mechanisms of human body function and physiological integration of the organ systems to maintain homeostasis. Students will be learning what the different organ systems do and how they do it. With this knowledge a student should be able to form a general understanding of how the body functions in health and disease. The general purpose of the lectures is to reinforce and expand upon the material presented in the text, with a focus on concepts and problem solving skills. Lectures will be further developed with reading assignments and discussion.
Prerequisite: One year of biology or PGY 206.

PGY 502: Principals of Systems Cellular/Molecular Physiology
Advanced survey of major mammalian physiological systems at the systems, cellular and molecular level; lectures, assigned reading, advanced texts or monographs, demonstrations and problem oriented study questions.
Prerequisite: One year each of physics and general chemistry; or PGY 206 or equivalent.

PGY 612: Biology of Aging (Crosslisted as ANA 612)

PGY 638: Developmental Neurobiology (Crosslisted as ANA 638)

PGY 774: Seminar in Physiology

PGY 791: Research in Physiology
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 15 credits.
Prerequisite: Permission of instructor.

Toxicology
TOX 663: Drug Metabolism and Disposition
Presentation of basic and advanced concepts in toxicology, with a specific focus on how toxins are absorbed, distributed throughout the body, metabolized, and excreted (ADME). The class is comprised of traditional didactic lectures and small group discussions about current topics and papers. In addition, the toxicological implications of pharmaceutical drugs and local, KY, environmental toxins are discussed. At the end of this class students should be able to create reasonable hypothesis as to how various toxins are dealt with by the human body.

TOX 770: Toxicology Seminar
A specialized seminar focusing on current topics of toxicological significance. Registration each fall and spring semester required of all toxicology majors until residency requirements for the degree have been completed. May be repeated to a maximum of three times during a semester and for a maximum number of two credits during entire graduate course work.

TOX 780: Special Problems in Toxicology
Exposure to and actual research experience in an area of toxicology other than that encountered by students in their thesis and dissertation research. May be repeated to a maximum of six credits.
Prerequisite: Permission of instructor.
TOX 790: Research in Toxicology
Individualized laboratory and research experience under the supervision of a faculty member. May be repeated to a maximum of 12 credits.
Prerequisite: Permission of instructor.

Spring Semester 2017
Anatomy
ANA 600: Seminar in Anatomy

ANA 611: Regional Human Anatomy
Functional human anatomy covering all regions of the body utilizing dissection techniques with an emphasis on cross-sectional anatomy and normal morphology. Lecture, four hours; laboratory, four hours per week.

ANA 780: Special Topics in Neurobiology
A lecture/seminar course offered based on contemporary topics in neurobiology. Course is designed to offer different emphasis in a given year and to cover timely topics.
Prerequisite: Permission of instructor.

ANA 790: Research in Anatomy

Biochemistry
BCH 401G: Fundamentals of Biochemistry

BCH 419G: Molecular Basis of Human Disease
The goal of this course is to provide students with an understanding of the defining characteristics of the major human diseases, the molecular mechanisms responsible for causing these diseases, and some of the molecular technologies used to diagnose and treat them.
Prerequisite: BCH 401G

BCH 604: Structural Biology
An advanced course on the structure and function of proteins and nucleic acids. Topics include: the physical determinants of protein structure, classification of protein architecture, protein-nucleic acid and protein-protein interactions, sequence dependence of nucleic acid structure, ribozymes, dynamics and evolutionary relationships.
Prerequisite: IBS 601, 602; BCH 607, 608; equivalent.

BCH 608: Nucleic Acids
An introductory graduate-level biochemistry course focused on the cellular mechanisms that underlie the regulated expression of genes, including transcription and translation, as well as basic mechanisms of DNA replication/repair and recombination. Genetic engineering and other experimental approaches critical to molecular biology research will be reviewed.
Prerequisite: CHE 105, 107, 230 and 232; BIO 150 and 152; or equivalents.

BCH 610: Biochemistry of Lipids and Membranes
A lecture and seminar course devoted to intermediary metabolism of lipids and various biochemical aspects of the structure, assembly and functions of biological membrane systems.
Prerequisite: CHE 232, CHE 444G, BCH 401G, BCH 502 or BCH 811. BCH 502 may be taken concurrently.
**BCH 615: Molecular Biology (Crosslisted as BIO/MI 615)**
An integrative and functional approach to the regulatory aspects of DNA, RNA and proteins in procaryotic and eucaryotic cells. Lectures and discussions with readings in original literature. **Prerequisite:** A course in genetics (e.g. BIO 304) and a course in nucleic acids and elementary molecular biology (e.g. BCH 502); or permission of instructor.

**BCH 619: Student Seminar**
A weekly seminar, required of all students majoring in biochemistry, devoted to discussions of areas not covered in other courses and to recent developments in the field. May be repeated to a maximum of five credits.

**BCH 640: Research in Biochemistry**

**Behavioral Science**
BSC 788: Drug Abuse: Contemporary Theories and Issues

**BSC 790: Research in Medical Behavioral Sciences**

**Microbiology, Immunology, and Molecular Genetics**
MI 494G: Immunobiology

**MI 495G: Bacterial Pathogens (Crosslisted as BIO 495G)**
This course will examine the pathogenic mechanisms used by bacteria to cause human disease. Bacterial virulence factors and host susceptibility factors will be discussed, with an emphasis on understanding the techniques that can be used to identify these traits in newly emerging pathogens. **Prerequisite:** BIO 308, 315, 401; or permission of instructor.

**MI 772: Seminar in Microbiology**

**MI 798: Research in Microbiology**

**Pharmacology**
PHA 422G: Pharmacology of Treating Human Disease

**PHA 622: Molecular Drug Targets and Therapeutics (4 sections)**
PHA 622 is an advanced course designed to provide graduate students with state of the art information regarding drugs, drug action and targets for drug action. Each section is designed to be a separate one hour course. Students may take any combination of sections from one to all four sections. For each agent, emphasis will be placed on the cellular mechanisms of action, the receptors or cellular targets at which they act, therapeutic issues and potential toxicities. This information is intended to be integrated with other disciplines, including anatomy, biochemistry, physiology, psychology and molecular biology. **Prerequisite:** IBS 601-609; PHA 621.

- **Section 001** - Cardiovascular Pharmacology
- **Section 002** - Neuropharmacology
- **Section 003** - Chemotherapeutic Agents
- **Section 004** - Autacoids and Endocrine Pharmacology and Toxicology
PHA 750: Research in Pharmacology

PHA 770: Seminar in Pharmacology

**Physiology**

PGY 412G: Principles of Human Physiology

**PGY 512: Evolutionary Medicine**
This online course surveys the consequences of evolution on human function and disease. Lecture materials, online discussions, and reading and writing assignments will expand on examples of the repercussions of evolutionary processes on health.

**Prerequisite:** BIO 150-153 or equivalent introductory biology sequence; BIO 315 or equivalent; an introductory physiology course (PGY 206, BIO 350, or PGY 412G).

**PGY 535: Comparative Neurobiology and Behavior (Crosslisted as BIO 535)**
The course consists of an introduction to neurophysiology and study of the neural basis of sensory processing and motor patterns. A comparative analysis of the neurobiological basis of behavioral responses will be made, utilizing a broad range of vertebrates and invertebrates.

**Prerequisite:** BIO 350; or permission of instructor.

**PGY 604: Advanced Cardiovascular Physiology**
The objective of this course is to examine in-depth the various functions of the cardiovascular system and their proposed mechanisms.

**Prerequisite:** PGY 502 or consent of instructor.

**PGY 638: Developmental Neurobiology (cross listed with ANA)**

**PGY 774: Seminar in Physiology**

**PGY 791: Research in Physiology**

**Toxicology**

**TOX 560 Environmental Physiology and Toxicology (Crosslisted as BIO 560)**
Emphasis will be placed on the physiological and toxicological effects of chemicals on natural biota, including considerations at cellular, organismal, population, and community levels. This will include assimilation and metabolism of pollutants by animal species, with emphasis upon biochemical and physiological mechanisms involved in stress-induced responses and stress reduction. Additional areas of concern will include the transport, fate, and effects of chemical stressors on structure and function of biotic communities and will include introductions to ecotoxicology and environmental regulatory strategies. Lecture, three hours; recitation, two hours per week.

**Prereq:** BIO 350 or PGY 502 or equivalent; or consent of instructor.

**TOX 680 Molecular Mechanisms in Toxicology**
An intensive examination of the chemistry and action of substances which adversely affect living systems, and consideration of means of lessening their impact on man and the environment.

**Prereq:** TOX 509 or consent of Director of Graduate Studies.
MSMS Faculty and Staff

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Student Checklist for Masters of Science in Medical Sciences  
-Plan A Option- 

1. Be sure to enroll in the semester for which you were accepted. 

2. Establish a course curriculum with your advisor, advisory committee, or DGS of the MSMS program. 

3. Identify, design, and conduct a research project with your research advisor. 

4. Identify a research advisory/examination committee at least one (1) year before you plan to graduate. 

5. Complete your thesis based on the format described by the Graduate School and in consultation with your research advisor. 

6. Successfully pass your Master’s examination (thesis defense).  

-Please follow the guidelines below during the semester that you intend to graduate- 

Forms: Be sure check the “Forms” page on the Graduate School web site under “Students in Master’s/Specialist Programs” for accessing, filling out, and submitting important forms. 

Application for Degree: The application for a degree is due within 30 days after the beginning of the semester (15 days for 2nd summer session). Go to “myuk” and click on “Student Services” then “myRecords” and then “Graduate Degree Application”. You need to check the Academic Calendar in the registrar’s office for specific deadlines related to the semester you intend to graduate. 

Request for Final Master’s Examination (Thesis Defense): You must submit the Request for Final Master’s Examination form at least 2 weeks prior to examination. You may access and submit the form here. 

Date of examination: The thesis defense must take place no later than eight days prior to the last day of classes in the semester which you intend to graduate. The defense may not be scheduled during the period between semesters or between the end of the eight-week summer session and the beginning of the fall semester. Check the Academic Calendar for deadlines to schedule your thesis defense. 

Thesis: The final, accepted thesis document must be submitted to the Graduate School no later than 60 days following the date of your defense. You will not have the entire 60 days if you defend late in the semester that you intend to graduate (check the Academic Calendar for submission deadlines). Prior to the final submission you must have your thesis reviewed by the Graduate School to check for correct formatting. This process takes about 48 hours but may take longer during peak periods, especially during the end of the semester. 

Note: The Graduate School policy states that you will not be allowed to sit for the exam if you have unresolved academic issues. Therefore, you need to check your transcript to ensure there are no missing grades or coursework in which you received a grade of “I”. In addition, you must be in good academic standing (your GPA is 3.00 or higher).
The Master of Science degree in Medical Sciences Plan A option requires:

- successful completion of the MSMS core curriculum
- at least 24 credit hours of graduate level course work with at least 2/3 of the course work in a traditional classroom setting (no special project, independent study, etc.) and at least 12 hours must be at the 600 or 700 level (excluding thesis credit)
- at least 6 hours of Master's Thesis Research (does not count towards the 24 credit hours of coursework)
- a minimum 3.0 grade point average for all course work
- successful completion of a Seminar course
- successful completion defense of thesis*
- submission of an approved written thesis to the Graduate School

The student should work with their mentor and/or the MSMS DGS to identify appropriate coursework beyond the required Core Curriculum.

### MSMS Core Curriculum (8 credits)

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<tr>
<td>IBS 602</td>
<td>Molecular Biology and Genetics (Fall)</td>
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<tr>
<td>IBS 606</td>
<td>Physiological Communications (Spring)</td>
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<tr>
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<td>Ethics (Spring)</td>
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<tr>
<td>MI 772</td>
<td>Seminar in Microbiology</td>
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Total Credits: 8

### Remaining Coursework (16 credits plus 6 hours of Master's Thesis Research)

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<tr>
<td>xxx-768</td>
<td>Master’s Thesis Research</td>
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</table>

Total Credits: 22

Total Credits for the M.S. in Medical Sciences Plan A Option: 30

### Student Advisory/Thesis Committee

Committee Chair (advisor) ________________________________

Committee Member ________________________________

Committee Member ________________________________

Committee Member (if necessary) ________________________________
* Plan A requires defense of a written formal master's thesis according to the guidelines established by the Graduate School. The complete thesis must be provided to the student's committee at least 2 weeks prior to the defense date. The defense follows an oral presentation of the thesis research and is conducted by a committee of at least three faculty members. Typically the student's advisor chairs the committee. Students should consult with their advisor regarding the selection of committee members and scheduling of the exam (also see above Checklist).
Student Checklist for Masters of Science in Medical Sciences
-Plan B Option-

1. Be sure to enroll in the semester for which you were accepted.

2. Establish a course curriculum with your advisor, advisory committee, or DGS of the MSMS program.

3. Outline and conduct research or compose a literature review on a topic of interest.

4. Identify an examination committee one semester before you graduate.

5. Successfully pass your Master’s examination.

-Please follow the guidelines below during the semester that you intend to graduate-

**Forms:** Be sure check the “Forms” page on the Graduate School web site under “Students in Master’s/Specialist Programs” for accessing, filling out, and submitting important forms.

**Application for Degree:** The application for a degree is due within 30 days after the beginning of the semester (15 days for 2nd summer session). Go to “myuk” and click on “Student Services” then “myRecords” and then “Graduate Degree Application”. You need to check the Academic Calendar in the registrar’s office for specific deadlines related to the semester you intend to graduate.

**Request for Final Master’s Examination:** You must submit the Request for Final Master’s Examination form at least 2 weeks prior to examination. You may access and submit the form here.

**Date of examination:** The final examination must take place no later than eight days prior to the last day of classes during the semester in which you intend to graduate. Final examinations may not be scheduled during the period between semesters or between the end of the eight-week summer session and the beginning of the fall semester. Check the Academic Calendar for deadlines to schedule your final examination.

**Note:** The Graduate School policy states that you will not be allowed to sit for the exam if you have unresolved academic issues. Therefore, you need to check your transcript to ensure there are no missing grades or coursework in which you received a grade of “I”. In addition, you must be in good academic standing (your GPA is 3.00 or higher).
The Master of Science degree in Medical Sciences Plan B option requires:

- successful completion of the MSMS core curriculum
- at least 30 credit hours of graduate level course work with at least 2/3 of the course work in a traditional classroom setting (no special project, independent study, etc.) and at least 15 hours must be at the 600 or 700 level
- a maximum total of three (3) hours of credits in a non-thesis research course
- a minimum 3.0 grade point average for all course work
- successful completion of a Seminar course
- successful completion of a final exam*

The student should work with their major advisor and/or the MSMS DGS to identify appropriate coursework beyond the required Core Curriculum.

**MSMS Core Curriculum (8 credits)**

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Total Credits: 8

**Remaining Coursework (22 credits)**

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Non-thesis/non-resident research (XXX 790, **NOT XXX 768**) 3

Total Credits: 22

**Total Credits for the M.S. in Medical Sciences Plan B Option: 30**

**Student Plan B Exam Committee**

Committee Chair (mentor) ________________________________

Committee Member ________________________________

Committee Member ________________________________

Committee Member ________________________________ (if necessary)
* Students opting to take the Plan B non-thesis route should register for no more than 3 credit hours of XXX 790 research. Plan B does not have a formal written thesis but does require a final master’s exam that involves a written document covering their research project or, if no research is conducted, a research paper based on a student’s area of specialization. The report should be at least 12-15 double spaced pages in length (*not including title page, figures, and references*). The general format of the actual Plan B final master’s exam is up to the student’s advisory committee. For example, the committee may require the student to prepare a PowerPoint-style presentation that will serve as the basis for questioning about the research report. The research report (or paper/proposal- see below) must be provided to the committee at least *two weeks prior* to the date of the exam. The presentation would include the hypothesis to be tested, the methodology used, the results of the study, interpretation of the results, and future directions. Students who do not conduct any research would be asked to write a research proposal in an area of interest and their final exam would follow the same guidelines and format as above. Students should consult with their advisor regarding the selection of committee members and scheduling of the exam (also see above Checklist).