College of Pharmacy

Master of Science in Pharmaceutical Sciences

2014/2015 Catalog
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College of Pharmacy

Master of Science in Pharmaceutical Sciences

Accreditation
Western University of Health Sciences is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC, 895 Atlantic Avenue, Suite 100, Alameda, California, 94501, phone number: 510-748-9001), a regional accrediting body recognized by the Council on Higher Education Accreditation and the U.S. Department of Education.

Program Objectives
The major focus of the Master of Science in Pharmaceutical Sciences (MSPS) program is to provide students with a strong research focus, training and skills in order to prepare them for careers in academia, the pharmaceutical industry, or public/private research institutions.

Program Overview
A minimum of 40 semester credit hours is required for completion of the MSPS program. This includes 20 hours of didactic study and 20 hours of research credits, leading to a thesis. The program emphasizes research in pharmaceutical sciences.

Program Faculty
Program faculty are part of the Department of Pharmaceutical Sciences in the College of Pharmacy. Their areas of research emphasis include pharmacology, pharmaceutics, pharmacokinetics, drug metabolism, pharmacogenomics, toxicology, and molecular immunology.

Application and Admissions Requirements
Graduates with a Bachelor of Science or Arts degree in pharmacy, chemistry, biology or a related scientific area are eligible for application.

Minimum criteria to receive consideration for admission are as follows. Meeting these criteria, however, does not guarantee admission into the program.

- A completed Western University of Health Sciences Graduate Application form (including all supplemental information for international applicants).
- Official transcripts of all undergraduate and graduate coursework with an overall GPA of 2.50 or greater on a 4-point scale.
- Official test scores for the general aptitude portion (verbal, quantitative, and analytical) of the Graduate Record Examination (GRE) taken within the last five (5) years, with a combined verbal and quantitative score of greater than or equal to 300 is recommended.
- Three letters of reference from individuals who are familiar with the applicant’s scholarship and research potential.
• All applicants submitting course work from foreign schools are required to pass English language requirements before they are eligible for financial assistance. A minimum score of 89 on the Internal Based TOEFL (iBT) or 6.5 on the IELTS is recommended. Only iBT scores less than 2 years old from the application deadline will be considered.

Application Deadline
Applications must be received (including all supporting application materials) no later than September 1 for the spring semester and April 1 for the fall semester. A completed application that arrives before the deadline may be considered on a rolling basis.

Applicants with Foreign Coursework
Applicants who wish to use coursework completed outside the United States must submit their transcripts for evaluation to a Western University of Health Sciences Approved Service at the candidate's expense. A course-by-course evaluation is required and all coursework must be designated as undergraduate, graduate or professional. WesternU only honors evaluations from one of the above services. The official evaluation must be included with the supplemental application packet.

International Students
International students and any other applicants who are not U.S. citizens and who are living in the U.S. should be prepared to provide proof of legal U.S. residency at the time of interview. Proof of legal U.S. residency is required prior to any offer of acceptance. For more detailed information, please visit our web page for International Students.

Transfer Credit
A maximum of 8 graduate level credits in which the student has earned an “A” from an equivalent program from another accredited U.S. university will be honored towards the Master of Science in Pharmaceutical Sciences for students transferring into WesternU. The Department of Pharmaceutical Sciences must approve all transfer credit, and the decision of the Department is final.

Registration
All MSPS students are required to register by the registration deadlines specified by the University Registrar. Registration dates are posted at: http://www.westernu.edu/registrar/registrar-online-information/. Failure to register by the deadline may be grounds for administrative withdrawal. All students registering after the posted deadline will be assessed a $30.00 per business day late fee.

Full tuition and fees and all prior debts must be paid in full on or by posted deadlines each academic year. Matriculation is subject to the satisfactory completion of all academic requirements and payment of all outstanding debts to the University. The receipt of a final transcript(s) from all colleges/universities attended is required for incoming students. Also, all students must show proof of current health insurance coverage by the deadlines provided by the University Registrar. This coverage must be maintained or in effect throughout the academic year. If there is no proof of current coverage, students will be automatically enrolled in the school sponsored insurance plan.

Withdrawing from Courses
Courses may be dropped without academic penalty on or before end of the third week of the semester. A course may be dropped after the third week of the semester only under unusual conditions. When the MSPS Director of Graduate Education (MSPS Director), approves dropping the course under such circumstances, a “W” will be assigned for the course.
Full-time/Part-Time Status

All students enrolled in 8 units of coursework are considered full-time students in the MSPS program.

Time Limits

The Master of Science in Pharmaceutical Sciences program is designed to be completed in two (2) years of full-time study. The requirements for the degree must be fulfilled within three (3) years from the date of matriculation to the program. Exceptions must be approved by the program.

Tuition and Fees

In estimating costs for one academic year of study at Western University of Health Sciences’ MSPS program, you should include tuition and fees, books and supplies, room and board, and other miscellaneous expenses. By action of the Board of Trustees, MSPS tuition and fees for the 2014-2015 academic year (subject to change) are as follows:

$714.00 Per Credit Hour

Other Fees and Expenses

$30.00 Registration Late Fee (per business day)
$350.00 Graduation Fee
$470.00 Annual Parking Permit (Auto)
$25.00 Parking Permit Replacement Fee
$40.00 Locker Key Replacement Charge
$10.00 Official Transcript (Each)
$21.00 Rush Transcript, First Class Mail (Each)
$25.00 Rush Transcript, Federal Express (Each)
$10.00 Student ID Replacement Fee
TBD Breakage Fee (Replacement Cost)

Financial Support

Financial support, which includes a stipend and full payment of tuition, is available to qualified applicants on a limited, competitive basis in the form of teaching and research assistantships. Support is for 12 months (including summers) and is limited to a total of two consecutive years for any student. Students may also receive a travel stipend, which allows for travel to a national meeting.

Academic Requirements

Attendance and Absences

Attendance is required at all scheduled instructional periods. Absence from instructional periods for any reason does not relieve the student from responsibility for the material covered during the periods missed.

Vacation and Emergencies

Students receive two weeks’ vacation each year over the Christmas break. Students may not expect to take more time than this, may not leave early or return late from the break. Vacations are not provided during academic semesters. Summers are the optimal time for focused research effort and as such no vacation time is allowed for this period. Under special circumstances, a student may arrange a brief 1-3 days off at the discretion of the MSPS Director and their faculty advisor in advance. It is the MSPS Director’s and faculty advisor’s prerogative whether to grant the time off and is not guaranteed.
Students should not enter the program with the expectation of taking time off for other pursuits (i.e., interviews for other programs, leaving the country, hobbies, etc.)

Emergencies, including medical problems or serious personal/family issues, which result in less than 15 academic days (3 calendar weeks) away from campus, may be granted upon approval by a student’s faculty advisor, in conjunction with the MSPS Director. Any missed course material is the responsibility of the student, and students may be required to complete alternative assignments, at the discretion of course faculty.

Students with emergencies resulting in more than 15 academic days (3 calendar weeks) away from campus must apply in writing for a Leave of Absence to the appropriate College Dean or his/her designee. Please see the University Catalog’s “General Academic Policies and Procedures” for more specific information on a Leave of Absence.

Thesis

The thesis will be based on a research project that the student will undertake in the MSPS program. The faculty advisor will help the student select a topic and mentor the student in his/her progress.

MSPS candidates are required to present a written report of the thesis and present it to the thesis advisory committee for approval. In addition, students will be required to defend their theses via an oral presentation of the thesis content at the end of the program. The oral defense may also include questions based on the required course work completed by the student. The defense committee will consist of the thesis committee and an external member from within the Western University of Health Sciences faculty, whose role will be to ensure that the defense is conducted fairly.

All candidates must pass a comprehensive examination covering the coursework, as well as the research and thesis. Successful completion requires the unanimous support of all members of the thesis advisory committee. If a student fails the oral examination, a re-examination may be accorded the student based upon the recommendation of the thesis advisory committee and approval of the Director of Graduate Education. Further re-examination may be allowed only under exceptional circumstances and only with the approval of the MSPS Director, Department Chair and the Dean of the College of Pharmacy.

Upon satisfactorily passing all examinations, students are to provide 7-8 professional printed copies of their thesis for their committee members (3-4 copies), the department (1 copy), the dean’s office (1 copy), and the university library (2 copies).

A fee will be charged to the student for microfilming his/her thesis.

Faculty Advisor and Thesis Advisory Committee

The faculty advisor serves as the chair of the student’s thesis advisory committee and helps the student in his/her choice of electives and research projects/thesis topic. Further, the advisor may also assist the student in obtaining a research assistantship if funds are available. The chair is responsible for the satisfactory academic progress of the student, and must hold committee meetings with the student on a regular basis.

Each student will be assigned a faculty advisor prior to admission to the program, and must remain with that advisor for the duration of the degree program. The thesis advisory committee consists of at
least three faculty members (the faculty advisor plus two other faculty members). The chair and at least
two of the committee members must be full-time faculty in the Department of Pharmaceutical Sciences
at the Western University of Health Sciences College of Pharmacy. Upon approval by the Director of
Graduate Education, a fourth member from outside of the department may be eligible for appointment
to the committee.

Graduation
A student will be recommended for the Master of Science in Pharmaceutical Sciences degree
provided he/she:

a) Is not on probation or suspension and has completed all prescribed academic requirements
   with a cumulative grade point average of above 3.00 and has no outstanding grade of “I,”
   “NCR,” or “U”. A 2.00 (C) grade earned in any class may be applied toward graduation only
   if the overall grade point average at the time of application for graduation continues at a
   minimum 3.00 (B) cumulative grade point average.

b) Has satisfactorily completed and orally defended a written thesis.

c) Has demonstrated no serious deficiencies in ethical, professional, or personal conduct, as
defined in University Catalog, “General Academic Policies and Procedures” section, which
would make it inappropriate to award the degree of Master of Science in Pharmaceutical
Sciences.

d) Has complied with all the legal and financial requirements of the University as stated in the
   University Catalog.

e) Has attended in person and participated in the Commencement ceremony at which time the
   Master of Science in Pharmaceutical Sciences degree is conferred. Unless special permission
   has been granted by the Dean, each student must participate in their respective
   commencement ceremony. Requests for excusal will only be granted for extenuating
   circumstances, such as a prior military commitment.

Students may participate in commencement activities provided they will complete all requirements
of the program by December 31st of that calendar year. No student will receive his or her degree until
the student has completed all requirements for graduation. Degrees will be dated as appropriate to
completion date.

Standards of Academic Progress
Only grades in Western University of Health Sciences courses approved for graduate credit will be
used in determining the overall grade point average for continuation in the MSPS program. If, at the
end of any semester, the cumulative grade point average falls below 3.00, the student will be placed on
academic probation, and financial support will be discontinued. A 2.00 (“C”) grade earned in any class
may be applied toward graduation only if the overall grade point average at the time of application for
graduation continues at a minimum 3.00 (“B”) cumulative grade point average. Any grade below a 2.00
(“C”) may not be applied toward graduation.
**Graduate Student Performance Ad Hoc Committee**

The Graduate Student Performance Ad Hoc Committee (GSPC) will be formed to: (1) recommend policies and standards for students’ academic performance; (2) review student performance and professional conduct and advise students’ faculty advisors in cases where counseling may be appropriate; and (3) review all cases involving grade appeals and allegations of academic or professional misconduct. All policy recommendations from the GSPC are forwarded to the Department Committee; all recommendations concerning academic or disciplinary action are forwarded to the Dean of the College of Pharmacy.

**Probation or Academic Suspension**

Students may be placed on Probation or Academic Suspension for the following reasons (these are in addition to the reasons listed in the WesternU General Academic Requirements section on Probation in the Overview Section of this Catalog):

1. Inadequate academic progress as determined by the Graduate Student Performance (GSPC) Committee. This includes, but is not limited to, receiving a “U” grade in any course or system.

2. A semester or cumulative grade point average below 3.00.

3. Failure to perform in a professional manner.

4. Serious deficiencies in ethical or personal conduct.

Students on Academic Suspension are not registered as an active matriculant and should use this time to remediate for the deficiency for which the Academic Suspension was levied. On campus students on probation must meet with their faculty advisor at least once a month. It is the student’s responsibility to contact the faculty advisor to arrange these meetings.

A student on probation for receiving a grade of “U” or for a GPA less than 3.00 in a semester will be removed from probation after one semester provided he/she has regained a cumulative GPA of at least 3.00 and/or has remediated the failed course. Students on probation are to remove themselves from all leadership roles in co-curricular activities associated with the University and/or with professional associations.

**Financial Aid Warning Policy (Title IV and Title VII)**

If a student is not making Satisfactory Academic Progress (SAP) they may be placed on “Financial Aid Warning” status for the next payment period and continue to receive financial aid for that period. Financial Aid is any financial assistance offered to the student for paying for their education, such as loans, scholarships, Federal Work-Study, grants and stipends (judged on the criteria of the stipend). Students who fail to make SAP by the end of the payment period lose Financial Aid eligibility.

It is the policy of the Financial Aid Office (FAO) that once a student has been placed on academic probation for not meeting SAP standards as defined by the college, the FAO will automatically place the student in a Financial Aid Warning status. During the next academic term, if the student does not meet SAP standards and the college places the student on academic suspension, the student will no longer be eligible for financial aid. If the student appeals the academic suspension and the appeal is approved, financial aid will be reinstated. If the student is directed to audit courses, those courses will not be covered by financial aid.
Tutorial Assistance Program

A Tutorial Assistance Program (TAP) has been established to assist students experiencing academic difficulty. Students will be recommended for this program by a faculty advisor or professor. Students may self-identify to TAP to receive assistance. The tutors will be chosen on the recommendation of the faculty in each discipline. Group tutoring is the methodology most used by the TAP department. For assistance, contact the Learning Enhancement and Academic Development Office (LEAD).

Dismissal

If the cumulative grade point average remains below a 3.00 after the student completes a total of 6 (six) graded credit units subsequent to being placed on academic probation, the student will be dismissed from the program. Students who receive a no-credit grade for PHSC 6999 (Research and Thesis) will be dismissed regardless of GPA or academic standing in the program.

Evaluation and Grading

Program Learning Outcomes

Knowledge of Pharmaceutical Sciences
Graduates should be able to demonstrate knowledge of the interdisciplinary field of Pharmaceutical Sciences including drug target discovery, design of new drugs, drug delivery, pharmacodynamics, and pharmacokinetics.

Research Skills
Graduates should be able to demonstrate research skills specific to their field of study including the ability to examine and identify gaps in scientific literature, generate a testable hypothesis, design and conduct experiments, analyze and interpret data, and draw conclusions to help advance the scientific field.

Critical Thinking
Graduates should be able to evaluate evidence through appropriate statistical analysis, proper interpretation of data, and by making logical and appropriate inferences.

Oral Communication Skills
Graduates should be able to demonstrate oral communication skills, which includes public speaking and generating clear presentations that utilize graphics to convey complicated information.

Written Communication Skills
Graduates should be able to demonstrate written communication skills, which includes writing for a specialized audience as well as a general scientific audience.

Collaboration Ability & Attitude
Graduates should be able to collaborate on projects and use team work to advance the goals of their project.

Leadership Skills
Graduates should be able to demonstrate leadership skills through student-led teaching, training others in the laboratory setting, and taking ownership and responsibility for their assigned duties.
Moral, Ethical, & Humanistic Reasoning and Decision Making
Graduates should be able to demonstrate ethical conduct and be able to reason through ethically questionable situations related to their scientific field.

Life-Long Learning
Graduates should be able to practice independent life-long learning skills related to their specific discipline as demonstrated by voluntary self-motivated acquisition of knowledge and skills.

Grading Scale
Final course grades are given based upon the traditional 4-point letter system, as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Equivalent</th>
<th>GPA Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4.00</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3.00</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2.00</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory</td>
<td>0.00</td>
</tr>
<tr>
<td>CR</td>
<td>Credit</td>
<td>N/A</td>
</tr>
<tr>
<td>NCR</td>
<td>No Credit</td>
<td>N/A</td>
</tr>
</tbody>
</table>

ADMINISTRATIVE GRADES

<table>
<thead>
<tr>
<th>Grade</th>
<th>Equivalent</th>
<th>GPA Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>Audit</td>
<td>N/A</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
<td>N/A</td>
</tr>
<tr>
<td>W</td>
<td>Withdrawal</td>
<td>N/A</td>
</tr>
<tr>
<td>M</td>
<td>Missing</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Incomplete
An Incomplete grade ("I") will only be assigned to students whose professional commitments and/or personal responsibilities prevent him or her from completing the requirements of the course. A student may remove an incomplete by completing course requirements within the following six calendar months or the final grade will be permanently recorded as a “U”. This rule applies regardless of the student’s enrollment status. A student not enrolled during the following six months must still successfully remove the “I” grade. The instructor must certify any grade changes. The “I” grade will remain on the student’s transcript, along with the final grade assigned by the instructor.

Grade Reports
Official grades are turned in to the Registrar from the Departmental Office, at which time the online student records system, BanWeb, is updated. Official grade reports and unofficial transcripts will be available on the BanWeb student records system throughout the academic year.

Credit Hour Calculation
The MSPS program awards one credit hours for every 15 contact hours.
Grade Appeals Process

Appealing a Course Grade

If a student believes there is just cause to dispute a grade for a course, the procedure is as follows: Within five (5) days of receipt of the course grade, the student must make an appointment with the course instructor(s) who issued the grade. Upon written request from the student, the course instructor(s) shall review the case with the student, and a decision shall be made by the course instructor to affirm or modify the grade. Within ten (10) working days of the student’s written request, the course instructor shall notify the student in writing of the decision. A copy of the Grade Change Form shall be sent to the student and the Master of Science in Pharmaceutical Sciences Director.

Within five (5) working days following written notification to the student regarding the instructor’s decision, the student may appeal the decision in writing to the MSPS Director. The appeal request must be accompanied by a narrative explaining the basis for the appeal. The narrative should fully explain the student’s situation and substantiate the reason(s) for advocating a review of the prior decision of the instructor. The MSPS Director may grant an appeal only if a claim of (1) bias, (2) the appearance of new material and documentable evidence that was not available at the time of the instructor’s decision, or (3) procedural error that unfairly affected the decision-making process is substantiated by the Chair. Upon written request from the student with a valid appeal rationale, the MSPS Director shall review the case and within seven (7) working days shall issue a decision in writing to the student, which may affirm, modify, or reverse the previous action of the instructor.

The MSPS Director’s decision is final in all course grade appeals except when the MSPS Director is the official instructor of the course in question. In such a case, the student will direct his or her appeal to the Dean of the College of Pharmacy, following the same guidelines for an appeal to the MSPS Director. The decision of the Dean in this instance is final.

The student may remain in class pending the outcome of appeals, except in cases of summary suspension or when the Provost, Vice Provost or the Dean of the College Pharmacy has suspended the student or has otherwise determined that it is inappropriate for the student to remain in class.

Issues/Dispute Resolution Procedure

When an issue or dispute arises between students, the issue/dispute resolution process starts with communication among the involved students. If a satisfactory resolution is not arrived at that level, the matter should then be addressed with the course instructor or the faculty advisor. If the problem is not resolved at the faculty advisor/course instructor level, the matter should be brought to the MSPS Director, followed by the Dean and then the Provost/COO. If the matter has not been resolved at those levels, the final arbiter is the President.

When an incident arises involving a faculty member, the first step in the issue/dispute resolution process is discussion with the faculty member. If the matter is not satisfactorily resolved at that level, then the matter should be referred to the MSPS Director, Dean, and Provost/COO, in that order. The final arbiter is the Board of Trustees.

When an incident arises involving a staff member, the dispute resolution process begins with the MSPS Director, followed by the Dean. The Office of Human Resources is the final arbiter.
Failure to follow this sequence of steps will only serve to delay the appropriate resolution of the issue or dispute as the matter will only be referred back to the correct level in this chain of responsibility.

**Curriculum Organization**

To graduate, students must complete a minimum of 40 credit hours, including 8 credit hours of the two core courses (Advanced Pharmaceutical Sciences I and II), 8 credit hours of Graduate Seminar, 4 credit hours of Electives, and 20 credit hours of Research and Thesis.

**Required Courses**

<table>
<thead>
<tr>
<th>Subject/Course #</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSC 5101</td>
<td>Advanced Pharmaceutical Sciences I</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 5102</td>
<td>Advanced Pharmaceutical Sciences II</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6000</td>
<td>Graduate Seminar</td>
<td>2.00/Semester</td>
</tr>
<tr>
<td>PHSC 6999</td>
<td>Research and Thesis</td>
<td>5.00/Semester</td>
</tr>
</tbody>
</table>

**Total Required Credit Hours:** 36.00

**Elective Courses**

<table>
<thead>
<tr>
<th>Subject/Course #</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSC 5990</td>
<td>Directed Readings</td>
<td>1.00-4.00</td>
</tr>
<tr>
<td>PHSC 6101</td>
<td>Novel Dosage Forms</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6102</td>
<td>Advanced Physical Pharmacy</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6103</td>
<td>Product Development</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6201</td>
<td>Advanced Pharmacokinetics</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6301</td>
<td>Neuropharmacology</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6302</td>
<td>Advanced Pharmacology</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6401</td>
<td>Advanced Immunology</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6402</td>
<td>Advanced Immunology and Immunotherapies</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6701</td>
<td>Advanced Toxicology</td>
<td>4.00</td>
</tr>
<tr>
<td>PHSC 6901</td>
<td>Research Techniques: Theory and Practice</td>
<td>4.00</td>
</tr>
</tbody>
</table>

**Total Required Credit Hours:** 4.00
Course Descriptions

All courses are awarded letter grades, except when indicated otherwise.

PHSC 5101 Advanced Pharmaceutical Sciences I (4 credit hours)
This course covers a wide range of topics such as immunology, pharmacology, biostatistics and toxicology. Some laboratory safety and research techniques will also be discussed in the course.

PHSC 5102 Advanced Pharmaceutical Sciences II (4 credit hours)
This course covers a wide range of topics in advanced pharmaceutical sciences such as pharmaceutics, biopharmaceuticals, biotechnology, pharmacokinetics, drug metabolism and transport, and pharmacogenomics.

PHSC 5990 Directed Readings (1-4 credit hours)
Selected study of topics in the pharmaceutical sciences.

PHSC 6000 Graduate Seminar (2 credit hours, CR/NCR)
This course follows a discussion and seminar format where students are required to discuss current literature in the pharmaceutical sciences and present recent advances in the pharmaceutical sciences. The goals of this course are to provide the student with a well-rounded understanding of the current field of pharmaceutical sciences, presentation skills, and the ability to critically examine scientific literature. This course is required of all MSPS students in each semester of the program. Repeatable to a maximum of 8 credit hours.

PHSC 6101 Novel Dosage Forms (4 credit hours)
This course covers the theoretical basis and design of controlled release and site specific drug delivery systems such as transdermals, microspheres, liposomes and monoclonal antibodies.

PHSC 6102 Advanced Physical Pharmacy (4 credit hours)
This course discusses applications of physiochemical principles in the evaluation of pharmaceutical systems, preformulation, and drug transport.

PHSC 6103 Product Development (4 credit hours)
This course covers the formulation, evaluation and actual manufacture of pharmaceutical products.

PHSC 6201 Advanced Pharmacokinetics (4 credit hours)
This course covers pharmacokinetic and pharmacodynamic principles and methods used to study absorption, distribution, metabolism and excretion of drugs.

PHSC 6301 Neuropharmacology (4 credit hours)
Neuropharmacology principles will be introduced and integrated with experimental applications. Course topics include chemical and electrical transmission, neurotransmitter chemistry, neuroreceptor pharmacology and signal transduction mechanisms, structure and function of ion channels and ligand binding sites, synaptic plasticity, and an introduction to electrophysiology. Relevant and recent primary literature articles will be introduced for reading and subsequent group discussion.
PHSC 6302 Advanced Pharmacology (4 credit hours)
This advanced elective will address concepts and principles of neuronal identity and function that are germane to pharmaceutical sciences. Principles will be introduced followed by experimental applications. The course will integrate molecular, cellular, and behavioral concepts when applicable. Course topics include chemical and electrical transmission, neurotransmitter chemistry, neuroreceptor pharmacology and signal transduction mechanisms, structure and function of ion channels and ligand binding sites, synaptic plasticity with an introduction to electrophysiology. Relevant and recent primary literature articles will be introduced for reading and subsequent group discussion.

PHSC 6401 Advanced Immunology (4 credit hours)
This advanced elective will address concepts and principles of molecular biology and immunology with an emphasis in molecular neuroimmunology. Topics will include cells, organs and effector systems involved in both cell-mediated and humoral-mediated immune activity. Time will be spent looking at regulatory interactions among different components of the immune system and the deleterious effects of aberrant immune processes. Principles will be introduced, followed by experimental applications. Relevant and recent primary literature articles will be introduced for reading and subsequent group discussion.

PHSC 6402 Advanced Immunology and Immunotherapies (4 credit hours)
This course is designed to enable the students to understand basic principles of immunology and apply this knowledge to better immunotherapy development and the importance of immunology in pharmaceutical sciences.

PHSC 6701 Advanced Toxicology (4 credit hours)
This course will focus on the principles of toxicology and mechanisms of toxicity. Toxicology is the study of poisons. Examples of major toxic spills and human exposures will be discussed to illustrate the major adverse health effects associated with environmental toxins.

PHSC 6901 Research Techniques: Theory and Practice (4 credit hours)
This elective course will provide in-depth lectures addressing a wide variety of biochemical, pharmacological, physiological, behavioral, immunological and histochemical research methods as well as their application in basic science research and research that focuses on drug discovery. Cutting-edge or breakthroughs in research technologies will also be covered. The ultimate goal is to provide graduate students with the theoretical framework for understanding the most widely used research methods.

PHSC 6999 Research and Thesis (5 credit hours, CR/NCR)
Supervised research experiences for preparation of the thesis. Repeatable to a maximum of 20 credit hours.
**Honors and Awards**

The following award is considered for presentation to MSPS students annually:

Dean’ List
## Academic Calendar

### Fall 2014

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, August 11, 2014</td>
<td>MSPS Orientation, Fall Classes Begin</td>
</tr>
<tr>
<td>Monday, September 1, 2014</td>
<td>Labor Day – No Classes</td>
</tr>
<tr>
<td>Monday, October 13, 2014</td>
<td>Columbus Day – No Classes</td>
</tr>
<tr>
<td>Wednesday, November 26, 2014</td>
<td>Thanksgiving Recess Begins @ 5:00 p.m.</td>
</tr>
<tr>
<td>Monday, December 1, 2014</td>
<td>Classes Resume</td>
</tr>
<tr>
<td>Friday, December 19, 2014</td>
<td>End of Fall Semester Classes</td>
</tr>
<tr>
<td>Monday, December 22, 2014</td>
<td>Winter Recess Begins</td>
</tr>
</tbody>
</table>

### Spring 2015

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, January 5, 2015</td>
<td>MSPS Orientation, Spring Classes Begin</td>
</tr>
<tr>
<td>Monday, January 19, 2015</td>
<td>Martin Luther King Day – No Classes</td>
</tr>
<tr>
<td>Monday, February 16, 2015</td>
<td>President’s Day – No Classes</td>
</tr>
<tr>
<td>Monday, March 23, 2015</td>
<td>Spring Break Begins</td>
</tr>
<tr>
<td>Monday, March 30, 2015</td>
<td>Spring Classes Resume</td>
</tr>
<tr>
<td>Thursday, April 2, 2015</td>
<td>Honors Day</td>
</tr>
<tr>
<td>Wednesday – Friday, May 20-22, 2015</td>
<td>Commencement</td>
</tr>
<tr>
<td>Friday, May 22, 2015</td>
<td>End of Spring Semester</td>
</tr>
</tbody>
</table>