



**ALBANY COLLEGE
OF PHARMACY
AND HEALTH SCIENCES**



**GRADUATE STUDENT
HANDBOOK
2016-2017**





**ALBANY COLLEGE OF PHARMACY
AND HEALTH SCIENCES**

SCHOOL OF GRADUATE STUDIES

Message from the Dean

Welcome to the School of Graduate Studies at the Albany College of Pharmacy and Health Sciences!

Our Master of Science degrees in Clinical Laboratory Sciences Cytotechnology/Molecular Cytology, Health Outcomes and Informatics, Molecular Biosciences and Pharmaceutical Sciences offer unique and relevant education and training in core focus areas aimed at solving challenging problems facing healthcare, biomedical research and the pharmaceutical and biotechnology industries. I encourage you to fully engage in the wide range of opportunities that these graduate programs at ACPHS can offer you. Delve into your research projects, explore the College's facilities and resources, and connect with our current students and alumni to learn about their experiences and achievements. Our over 25 graduate faculty are thoroughly committed to training the next generation of scientific, clinical and administrative professionals to become leaders in pharmaceutical and biotechnology companies, healthcare institutions, government and academia. Contact us with any questions you may have about the graduate programs. Your success here at ACPHS and beyond is a major focus of our mission and we are here to assist you on your journey to achieving your goals.

The information in this handbook is designed to assist you in learning about the policies and procedures associated with our graduate programs. The School of Graduate Studies is committed to promoting your success. Please feel free to contact me or my office if you have questions or concerns about our graduate programs.

A handwritten signature in black ink, appearing to read 'Martha A. Hass'.

Martha A. Hass, PhD
Dean, School of Graduate Studies

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2016 – 2017 Academic Calendar

Fall Semester 2016

August 21-23	International Student Orientation (Friday-Tuesday)
August 24	Graduate Student Orientation
August 29	First Day of Classes (Monday)
September 5	Labor Day (Monday) – No Classes
September 23	Last Day to drop a course without academic penalty
October 2	Deadline for Application for December graduation to SGS
October 10-11	Fall Recess (Monday-Tuesday)
October 12	Classes Resume (Wednesday)
November 23-25	Thanksgiving Recess (Wednesday-Friday)
November 28	Classes Resume (Monday)
December 9	Deadline for submission of thesis to SGS for December graduation
December 9	Classes End (Friday)
December 12-16	Final Examinations (Monday-Friday)
December 19	December Graduation

Spring Semester 2017

January 16	Martin Luther King Day (Monday) – No Classes
January 17	Classes Resume (Tuesday)
February 10	Last Day to drop a course without penalty
February 20	President’s Day (Monday) – No Classes
February 21	Classes Resume (Tuesday)
March 10	Deadline for Application for May graduation to SGS
March 13-17	Spring Recess (Monday-Friday) – No Classes
March 20	Classes Resume (Monday)
April 28	Classes End (Friday)
May 1	Deadline for submission of thesis to SGS for May graduation
May 1–5	Final Examinations (Monday – Friday)
May 13	Commencement (Saturday)

Summer Semester 2017

May 22	First Summer Session Begins (Monday)
May 29	Memorial Day (Monday) – No Classes
May 30	Classes Resume (Tuesday)
June 30	First Summer Session Ends (Friday)
June 30	Deadline for Application for August graduation to SGS
July 3–July 7	Summer Break (Monday-Friday)
July 10	Second Summer Session Begins (Monday)
August 1	Deadline to Submit Thesis for August Graduation
August 18	Second Summer Session Ends (Friday)
August 18	August Graduation

I. Introduction

The School of Graduate Studies facilitates graduate education by promoting standards of academic excellence, supporting academic and extra-curricular activities of graduate students and by fostering intellectual and professional growth among all students and faculty engaged in graduate education at the College. The School of Graduate Studies coordinates all graduate program offerings, in collaboration with academic departments that house individual graduate programs. The School of Graduate Studies is responsible for providing leadership and oversight in the following areas:

- Graduate student recruitment and admissions for all graduate programs and dual programs with a graduate component; coordination of graduate student orientation
- Graduate student enrollment and maintaining graduate student records
- Review and implementation of new and existing graduate programs, concentrations, and courses; coordination of graduate course offerings, assessment, accreditation reviews, state approvals and resources
- Review and implementation of academic standards for all graduate programs
- Monitoring of graduate student progress, including oversight of thesis progress, selection of thesis committee and fulfillment of graduation requirements

ACPHS offers the following Master of Science and Dual Bachelor of Science/Master of Science degree programs:

Master of Science Programs

A. School of Arts and Sciences

1. Master of Science in Clinical Laboratory Sciences
Department of Basic and Social Sciences
2. Master of Science in Cytotechnology and Molecular Cytology (MSCT)
Department of Basic and Social Sciences
3. Master of Science in Molecular Biosciences (MSMBS)
Department of Basic and Social Sciences
4. Master of Science in Health Outcomes and Informatics (MSHOI)
Department of Population Health Sciences

B. School of Pharmacy and Pharmaceutical Sciences

1. Master of Science in Pharmaceutical Sciences (MSPS)
Department of Pharmaceutical Sciences

Dual Bachelor /Master of Science Programs

A. School of Arts and Sciences and School of Pharmacy and Pharmaceutical Sciences

1. Bachelor /Master of Science in Biomedical Technology/Cytotechnology (BMBC)
Department of Basic and Social Sciences
2. Bachelor /Master of Science in Biomedical Technology/Clinical Laboratory Sciences (BMBCLS)
Department of Basic and Social Sciences
3. Bachelor /Master of Science in Pharmaceutical Sciences (BMPS)
Department of Pharmaceutical Sciences

II. Graduate Programs *(See Appendix A for curricula and sample course schedules)*

A. Master of Science in Clinical Laboratory Sciences (MSCLS)

The Master of Science in Clinical Laboratory Sciences program is a 65 credit, 24 month program designed to educate and train students in clinical laboratory disciplines, including molecular diagnostics, laboratory management and the application of research techniques for evidence based decision making in the provision of laboratory services. This licensure program trains students in techniques of molecular diagnostics as well as the application of laboratory evaluation of new disease entities. The core didactic courses taken in the first year focus on the clinical disciplines within the clinical laboratory (e.g. hematology, clinical chemistry, clinical microbiology, immunohematology etc.). The courses combine the theory of disease diagnosis and laboratory diagnostic techniques with hands-on practice in manual as well as automated procedures. Additional core courses in statistics, proposal writing and literature evaluation are also a major component of the curriculum. The second year of the program emphasizes practical training in clinical laboratories of hospitals and clinics in the Capital Region. The program culminates in a capstone project, designed in collaboration between the student and project advisor. The capstone project is focused on the science and management of the clinical laboratory and the scientific and regulatory requirements of diagnostic laboratory medicine. This program enables graduates to take the national Board of Certification examination as a Clinical Laboratory Technologist (MLS) administered by the American Society of Clinical Pathology (ASCP) as well as the opportunity for an additional national certification in Molecular Biology (MB). Graduates are trained as generalists and are qualified by national certification and New York State licensure to work in several areas of a clinical laboratory, including hematology, microbiology, immunohematology, chemistry, immunology and molecular diagnostics. Clinical laboratory technologists work closely with clinical pathologists, physicians and other care providers to provide accurate and timely information to assist in the treatment of patients for the best possible outcomes. Graduates are also prepared for careers in forensic, quality control, and research laboratory settings. The Albany College of Pharmacy and Health Sciences Clinical Laboratory Sciences program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

B. Master of Science in Cytotechnology and Molecular Cytology (MSCT)

The Master of Science degree in Cytotechnology and Molecular Cytology is a 58 credit, 18 month program that includes didactic and laboratory coursework, coupled with clinical experiences to prepare students for certification in the profession of cytotechnology and molecular cytology. The program provides students with a foundation in biomedical and clinical sciences for the preparation and screening of specimens for cell- and molecular-based disease diagnosis. Cytotechnology training prepares students to be highly qualified diagnostic team members. Working with cytopathology professionals, students develop skills in the detection of changes in cellular preparations from all body sites for the early diagnosis of cancer, precancerous changes, and infections. Molecular Cytology expands the student's understanding of

pathology at the genomic and proteomic levels, by providing the fundamental knowledge of molecular genetics and the various diagnostic techniques used in the laboratory for diagnosis, to ultimately assist oncologists in personalizing the treatment for cancer patients based on the unique genetic profile. By combining both of these disciplines, the MS program in Cytotechnology and Molecular Cytology provides graduates with the abilities to move to the forefront of cell-based diagnostics. It also integrates and reinforces the understanding of many facets of pathology including cancer at the tissue, cellular and molecular levels. Graduates from this program are well-prepared for entry-level careers in diagnostic laboratories and biomedical research, as well as further graduate studies. The curriculum meets requirements for NYS licensure by the Office of the Professions of the NYSED and successful completion of the Board of Registry Examination administered by the American Society for Clinical Pathology (ASCP) for national certification as a cytotechnologist. Students certified in Cytotechnology (CT) may also qualify for certification in Molecular Biology (MB). The program curriculum culminates in a capstone project designed to further the student's diagnostic expertise. The Albany College of Pharmacy and Health Sciences Cytotechnology Program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP).

C. Master of Science in Health Outcomes and Informatics (MSHOI)

The MS in Health Outcomes and Informatics is a 36 credit, 24 month degree program designed to provide students with the knowledge and unique skills necessary for evaluating economic, clinical, and humanistic outcomes of medical interventions and services. Health outcomes research is used for making effective clinical and business decisions, improving patient-reported outcomes and health quality, and decreasing payer costs by discouraging the use of costly, ineffective treatments. The program emphasizes the management and analysis of health and healthcare data designed to identify best practices and eliminate escalating healthcare costs and inefficiencies. Students have the option to elect a thesis or non-thesis track in the MS in Health Outcomes and Informatics program at ACPHS. In both tracks, students receive a solid foundation in this discipline by focusing on the language and concepts of public health research and statistical methods, with courses in quantitative analysis and econometrics, as well as applied courses in health statistics, health policy, and health outcomes. Courses are taught in an interactive classroom environment, with students learning to design, implement, and analyze health outcomes studies and critically review and use outcomes research and data. The program emphasizes quantitative and analytical methods, assessment, and research in health outcomes. A core requirement of the thesis-track of the program is the completion of original research and the publication of a thesis describing that research. Students opting for the non-thesis track will complete a capstone project and experiential rotation in an industrial or corporate setting.

D. Master of Science in Molecular Biosciences (MSMBS)

The MS in Molecular Biosciences is a 33 credit, 24 month degree program designed to train outstanding scientists in the basic mechanisms of human health and disease. The program is interdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training and foundational didactic coursework. Research areas encompass a broad range of disciplines including molecular genetics, cell biology, biochemistry, pathophysiology, microbiology, immunology, and infectious diseases. The program offers courses in the core biomedical disciplines laboratory research techniques, ethical conduct of science, and a graduate seminar course. A major requirement for program is the completion of original research and the publication of a thesis describing that research. The program emphasizes the importance of high quality research, and is designed to assist students in fulfilling their potential as research scientists.

E. Master of Science in Pharmaceutical Sciences (MSPS)

The MS in Pharmaceutical Sciences is a 33 credit, 24 month degree program designed to educate students in the scientific disciplines required for the discovery, development and evaluation of new drugs and other pharmaceutical products. The program is interdisciplinary, bringing together scientists from the disciplines of pharmacology, physiology, pharmaceuticals, toxicology and medicinal chemistry, offering concentrations in both pharmacology and pharmaceuticals, and both thesis and non-thesis tracks. Students in both concentrations and tracks take foundational didactic courses in pharmaceutical sciences, statistical methods, ethics and journal club. Students enrolled in the thesis option work side-by-side with research graduate faculty in areas such as drug discovery and development, molecular modeling, chemical synthesis, in vitro and in vivo studies of drug mechanisms and pharmacological actions, pharmacokinetic analysis and the transport and absorption of nanopharmaceuticals. This path is ideal for those interested in working as research scientists or pursuing PhD or MD degrees. Non-thesis track students complete a Capstone Writing project which allows students to explore, in-depth, a topic of their choosing related to the pharmaceutical sciences.

F. Bachelor /Master of Science in Biotechnology/Cytotechnology (BMBC)

The dual BS/MS Biotechnology-Cytotechnology degree allows students to pursue two degrees simultaneously, thereby receiving both the BS and MS degree in five years. The program integrates the biological sciences with the medical sciences to give students the ability to enjoy successful careers as medical laboratory professionals and/or scientific researchers. The curriculum meets requirements for licensure by the Office of the Professions of the NYSED or completion of the Board of Registry Examination administered by the American Society of Clinical Pathology (ASCP). Students certified in Cytotechnology (CT) may also qualify for certification in Molecular Biology (MB). The program curriculum culminates in a capstone project designed to further the student's diagnostic expertise.

G. Bachelor /Master of Science in Biotechnology/Clinical Laboratory Sciences

The dual BS/MS Biotechnology-Clinical Laboratory Sciences degree allows students to pursue two degrees simultaneously, thereby receiving both the BS and MS degree in five years. The program integrates the biological sciences with clinical laboratory disciplines, including molecular diagnostics, laboratory management and protocols used in the delivery of laboratory services. This program enables graduates to take the national Board of Certification examination as a Clinical Laboratory Technologist (MLS) administered by the American Society of Clinical Pathology (ASCP) and national certification in Molecular Biology (MB). Graduates are trained as generalists and are qualified by national certification and New York State licensure to work in several areas of a clinical laboratory, including hematology, microbiology, immunohematology, chemistry, immunology and molecular diagnostics. The program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

H. Master of Science in Pharmaceutical Sciences (BMPS)

The combined BS/MS in Pharmaceutical Sciences integrates two existing degree programs, allowing students to complete both degrees within five years. The program is focused on educating students in the scientific disciplines required for the discovery, development and evaluation of new drugs. This dual degree fulfills general undergraduate education requirements, and maintains the graduate level academic quality by enhancing the research focus of both programs. Graduates from the program will have opportunities to conduct research in local and regional colleges and universities, in state research and analytical laboratories and in the biotechnology and pharmaceutical research and development sector. Graduates are also ideally positioned to continue graduate education toward a PhD degree or to pursue professional degrees in medicine, dentistry and related fields.

III. Graduate Admissions

College-wide admissions standards apply to all graduate programs offered at ACPHS. Specific graduate programs may impose additional admissions criteria as long as they meet the minimum institutional standards described below. Admissions decisions are based on the applicant's previous academic performance, rigor of previous academic programs, standardized test scores, recommendations, career and volunteer experience, personal statement, and commitment to pursuing graduate education.

The Graduate Faculty and the Graduate Admissions Committee are responsible for developing college-wide admissions standards for all graduate programs, including dual degree programs. All applications to all graduate programs, including dual degree program applications from internal or external candidates and transfer students are submitted directly to the Office of Graduate Admissions through PharmGrad (MSHOI, MSMBS, MSPS) or AHCAS (MSCLS, MSCMC). Offers of admission to all graduate programs, including dual degree programs, are made by the Dean of the School of Graduate Studies.

Applications for admission to graduate programs are reviewed by Program Admissions Committees that are staffed by graduate faculty affiliated with the graduate program and the Graduate Program Director. The Coordinator of Graduate Studies coordinates review and committee recommendations of applications for admission, which are then reviewed by the Dean of the School of Graduate Studies, who makes the final admissions decisions. The Dean of the School of Graduate Studies is responsible for informing applicants of the admission decision.

A. Admission Requirements

Applicants seeking admission to all graduate programs at the College must meet the following requirements. Some graduate programs may impose additional admissions criteria.

1. Master of Science Programs

- a. An earned B.S., B.A. or PharmD degree from an accredited academic institution. The earned degree must be in a discipline relevant to the graduate program and all required pre-requisite coursework must be completed prior to admission.
- b. A minimum grade point average (GPA) of 3.0 on a 4.0 scale from the earned degree program. Official transcripts for all graduate and undergraduate courses must be submitted. International applicants must submit transcript evaluations by World Education Services (WES) or Education Credential Evaluators (ECE).
- c. Official Score Reports for the Graduate Record Examination (GRE)
For the M.S. Pharmaceutical Sciences, M.S. Molecular Biosciences and M.S. Health Outcomes and Informatics programs, official Score reports for the Graduate Record Examination (GRE) must be submitted. The GRE must have been taken within the past five years. There is no required minimum GRE score for admission, but successful applicants typically score in the top 50th percentile. For other programs, the GRE is not required for admission, but an applicant with a GPA below 3.0 is required to take the GRE as a condition of admission or continued enrollment in the dual degree program. A personal statement (up to 1000 words) indicating professional areas of interests and goals, and reasons for applying to the specific graduate program at ACPHS.
- d. A current resume including educational and work experience, skills relevant to the selected graduate program, publications, presentations or other scholarly professional works.
- e. A minimum of two (2) letters of recommendation from professional sources affiliated with disciplines relevant to the graduate program. Recommenders should know the applicant well and be familiar with applicant's academic or professional experience and performance. Letters of recommendation are submitted through the PharmGrad or AHCAS system.
- f. For International applicants: Demonstrated proficiency in written and spoken English by TOEFL or IELTS exam scores that are less than 2 years old. A minimum score of 84 is required on the Internet-Based Test (ibT) TOEFL and a minimum score of 7 for IELTS for admission consideration.
- g. All candidates must complete an on-site or telephone interview prior to admission.

2. Dual Bachelor of Science/Master of Science Programs

- a. Internal ACPHS students or external transfer students may apply for admission to dual degree BS/MS programs. Applicants must complete at least four academic semesters of college-level coursework to be eligible to apply. An earned degree is not required, however all pre-requisite coursework required for the year of entry must be completed prior to admission.
- b. A minimum grade point average (GPA) of 3.0 on a 4.0 scale in all completed coursework and official transcripts for all graduate and undergraduate courses must be submitted. International applicants must submit transcript evaluations by World Education Services (WES) or Education Credential Evaluators (ECE).
- c. The GRE is not required for admission to dual degree programs at ACPHS. However, a student being considered for admission to a dual degree program who does not meet the required GPA for progression (3.0 out of 4.0) into the Masters component of the program, may be asked to take the GRE as a condition of admission or continued enrollment in the dual degree program.
- d. A personal statement (up to 1000 words) indicating professional areas of interests and goals and reasons for applying to the specific graduate program at ACPHS.
- e. A current resume including educational and work experience, skills relevant to the selected graduate program, publications, presentations or other scholarly professional works.
- f. A minimum of two (2) letters of recommendation from professional sources affiliated with disciplines relevant to the graduate program, who know the applicant well and are familiar with applicant's academic or professional experience and performance must be submitted.
- h. For International applicants: Demonstrated proficiency in written and spoken English by TOEFL or IELTS exam scores that are less than 2 years old. A minimum score of 84 is required on the Internet-Based Test (ibT) TOEFL and a minimum score of 7 for IELTS for admission consideration.
- g. All candidates must complete an on-site or telephone interview prior to admission.

B. Admission Procedures

All applications for admission to all graduate programs, including applications from prospective students from outside the institution (entry-level, transfer, and from affiliate institutions), and internal students applying to dual degree programs (BS/MS) or MS programs must be submitted to the Graduate Admissions Office via PharmGrad or AHCAS. Admissions application status and decisions are tracked through the PharmGrad/AHCAS system. Program-affiliated Graduate Faculty, members of the Program Admissions Committees, Program Directors, the Coordinator of Graduate Programs, the Dean of the School of Graduate Studies and the VP of Enrollment Management have access to the PharmGrad/AHCAS system and can view application status throughout the review process. The following process is followed for receipt and review of graduate admissions applications.

1. Completed applications received by the Graduate Admissions Office via PharmGrad/AHCAS are forwarded to the appropriate Program Director (PD) and Program Admissions Committee (PAC) for review. Incomplete applications will not be forwarded to Program Directors or Program Admissions committees, they will not be reviewed, nor will admissions decisions be made on incomplete applications.
2. PD/PAC review and make a recommendation on an application via the PharmGrad/AHCAS system. In some cases, the PD/PAC may request a waiver for graduate admissions requirement for an applicant. In these cases, PD/PAC makes the request, along with a rationale for the waiver, to the Graduate Admissions Committee which then makes a recommendation on the waiver to the Dean of the School of Graduate Studies. The Dean make the final decision on whether the requirements are waived. The decision is communicated to the PD/PAC and the applicant.
3. The Dean reviews recommendations received by the PD/PAC and makes a final decision on admissions. In case of disagreement between the PD/PAC and the Dean of the School of Graduate Studies on an admissions decision, the PD/PAC or the Dean may ask the Graduate Admissions Committee to mediate the disagreement. Thereupon, if the disagreement persists, the PAC or the Dean may ask the Graduate Admissions Committee to review the case and make a final admissions decision. Final admission decisions are communicated to the applicants by the Dean of the School of Graduate Studies.
4. Applicants are informed of the admissions decision through the PharmGrad/AHCAS system and through printed correspondence.
5. Upon receipt of a letter of admission, applicants typically have up to 30 days to accept or decline the offer of admission. Applicants must submit a deposit to secure enrollment in the program.
6. International students offered admission to a graduate program are required to document that they have sufficient funds available in US currency to support their educational expenses for the duration of their studies at ACPHS. Financial requirements to enroll in ACPHS degree programs are provided with the letter of acceptance. Financial evidence that shows the student or the student's parents or sponsors have sufficient funds to cover tuition, fees, studying and living expenses during the period of intended study must be provided to ACPHS in order for the I-20 form to be processed and issued to the student by the principal designated school official (PDSO). Tax documents, original bank books and/or bank statements may be used to demonstrate financial requirements have been met. These documents must be dated less than 90 days prior to submission to ACPHS.
7. Upon receipt of the student's deposit, the student will be registered for the graduate program.

C. Internal Transfer Between Graduate Programs

Graduate students currently enrolled in a graduate program at ACPHS may apply for transfer to another graduate program at the College. Students must complete an application for graduate program transfer. The application includes completing a transfer request form (available from the Registrar and the School of Graduate Studies)

which must be signed by the student's academic or thesis advisor and the current Program Director. The form must be submitted to the Office of Graduate Admissions with a cover letter from the student explaining the reasons for the transfer request and with the student's official transcripts.

Upon receipt of the completed transfer request application, the Office of Graduate Admissions will forward the application to the Program Director and Program Admissions Committee for which the student is applying. The PD/PAC review the request for transfer into their program and make a recommendation to the Dean of the School of Graduate Studies. The Dean of the School of Graduate Studies reviews the recommendation and makes a decision regarding the transfer request. The Dean will inform the student, PD and PAC of the decision regarding the transfer request. Students transferring from one graduate program to another must fulfill all degree requirements for the new program regardless of their status in the previous program to be eligible for graduation from the new program.

IV. Residency Requirements

A. Residency

Full time-graduate students must be enrolled at ACPHS for a minimum of two consecutive semesters to qualify for a graduate degree. Part-time graduate students must be enrolled at ACPHS for a minimum of 21 credit hours to qualify for a graduate degree.

D. Full-time and Part-time Status

Full-time status is defined as 9 or more credit hours of graduate coursework or thesis, or be registered for remaining course or thesis work in the final semester(s) of the degree. Part-time students are those that are enrolled in fewer than 9 credits of didactic course work with no thesis credits. International students must be registered for and maintain full time status for each semester, (except the summer terms) throughout the period of study. International students must obtain written permission from the principal designated school official (PDSO) to fall below the designated requirements for full-time status.

E. Leave of Absence

Graduate students may request a leave of absence by submitting a written request to the Dean of the School of Graduate Studies. The request should state the reason(s) for the leave and the duration of the leave requested and a specific anticipated date of return to the program. The Dean will discuss the request with the Program Director and the student's academic/thesis advisor. A leave of absence is typically limited to one year. The Dean of the School of Graduate Studies makes a decision on the request and informs the student, PD and the students' academic/thesis advisor of the decision on the leave of absence request.

V. Financial Assistance for Graduate Students

A. Tuition Scholarships

Graduate Tuition Scholarships for full-time graduate students entering a graduate program at ACPHS are available for highly qualified applicants. Prospective students applying to a graduate program at ACPHS are automatically considered for Graduate Tuition Scholarships when they submit their application for admission. Applicants are reviewed by Program Admissions Committees and scored based on prior academic achievement and promise of outstanding academic and professional contribution to the graduate programs at ACPHS. In evaluating applications, previous undergraduate and graduate coursework, evidence of ability and productivity in research, performance on the Graduate Record Examination (GRE), the student's personal statement and interactions during the interview are considered. The Dean of the School of Graduate Studies reviews all applications and committee assessments and makes the final decision for the awards. Admitted students are informed about tuition scholarships as part of the offer of admission. Students who enroll are guaranteed the tuition scholarship for four academic semesters, contingent upon the student maintaining a GPA in graduate coursework of 3.3 or higher and making satisfactory progress in their thesis research project. New graduate students who are offered Tuition Scholarships must indicate acceptance of the award by completing and signing the Tuition Scholarship Acceptance form and submitting it, along with an enrollment deposit and Enrollment Confirmation Form no later than 30 days after receipt of the offer. Tuition scholarship awards will be applied to the student's tuition bill.

B. Graduate Research Assistantships

Graduate Research Assistantships (GRA) to support students enrolled in thesis-bearing programs (MSHOI, MSMBS, MSPS) Full-time graduate students who have completed at least one academic semester in a thesis-bearing graduate program and who are in good academic standing are eligible to apply for the GRA. Students receiving financial support for their research efforts from other sponsoring agencies or those receiving an SGS sponsored Teaching Assistantship are not eligible for the GRA, however graduate students may simultaneously receive a tuition scholarship and a GRA award. Students receiving a GRA are required to work on their research project as a condition of the assistantship for a minimum of 10 hours and not more than 20 hours per week during the academic semester in which the award is made and are required to attend research seminars on campus. Graduate students receiving the GRA must maintain satisfactory academic progress toward degree completion to maintain the award and to maintain eligibility for continued funding in subsequent semesters. Graduate assistantships are awarded for one academic semester at a time, and may be renewed for up to three total academic semesters. Renewal of an assistantship award is dependent on availability of funds and assessment of student academic performance and progress in research. See Appendix B for information about applying for the GRA.

C. Graduate Teaching Assistantships

Graduate Teaching Assistantships (GTA) are available for qualified graduate students. Graduate teaching assistants serve under the direction of a faculty member in a didactic course, workshop or laboratory. The primary duties of a graduate teaching assistant may include preparing and/or delivering lectures in a didactic course, laboratory or workshop, preparing laboratory experiments and/or supervising students in a laboratory, preparing and grading tests, quizzes or other assignments and/or holding office hours or student conferences. Full-time graduate students who have completed at least one academic semester in good academic standing are eligible to apply for the GTA. Students receiving financial support from a sponsoring agency or those receiving an SGS sponsored GRA are not eligible for the GTA. Students may simultaneously receive a tuition scholarship and a GTA award. Specific work requirements vary depending on the course assignment but typically students receiving a GTA are work for a minimum of 5 hours per week but may not work more than 20 hours per week during the academic semester in which the award is made. Graduate students receiving the GTA must maintain satisfactory academic progress toward degree completion to maintain the award and to maintain eligibility for continued funding in subsequent semesters. Graduate assistantships are awarded for one academic semester at a time, and may be renewed for up to three total academic semesters. Renewal of an assistantship award is dependent on availability of funds and assessment of student academic performance and effectiveness in the teaching position. See Appendix B for information about applying for the GTA.

D. Other

Research graduate faculty who receive extramural funding to support their research may have funds available to support graduate students. Graduate students should consult with his or her thesis advisor to determine if such other funding is available through extramural research grants.

VI. General Graduate Degree Requirements *(See Appendix A for specific MS degree requirements)*

A. Minimum Credit Requirements

An MS degree typically requires two or more years for completion. The minimum requirement is at least one year of full time graduate study and 30 credit hours of course work and a capstone project or scholarly research, although all of the individual graduate programs have higher minimum requirements. See the College Catalog for specific academic credit requirements for each program.

B. Thesis and Non-Thesis Master of Science Degrees

ACPHS offers two general types of Master of Science degrees; thesis option and non-thesis option. A 'culminating experience' or special project is required by the New York State Education Department for all Master's degree programs. The culminating experience is a formal thesis for our thesis-bearing programs or a special project (capstone project) that is intended to affirm that the student has mastered their field of study.

1. Thesis option

Students enrolled in thesis-bearing Master of Science programs at ACPHS complete required didactic coursework and a minimum of 6 credit hours of original scholarly (thesis) research and write and defend a thesis. (Some programs require more than 6 credits of thesis research). The requirement for a culminating experience is met by writing and defending the thesis.

2. Non-thesis option

Students enrolled in non-thesis-bearing Master of Science programs at ACPHS complete required didactic course work and a final capstone project.

C. Course Requirements

Graduate students are required to complete all required and elective coursework for his or her degree program. Course requirements for each program can be found in Appendix A and in the ACPHS College Catalog under the School of Graduate Studies. All graduate students enrolled in thesis programs must successfully complete all required and elective coursework before they are eligible to present and defend their thesis. While not explicitly stated in the curriculum, graduate students enrolled in thesis programs are expected to engage in thesis research during the summer months.

1. Programs of Study

All graduate students must complete a Program of Study form and submit the completed form to the School of Graduate Studies at the end of each academic semester. The Program of Study is a listing of required and elective courses that are necessary to fulfill the didactic portion of the degree program, the dates of completion of the coursework or anticipated dates of completion, as well as the grade earned for each course. The Program of Study form for each MS program is available on the SGS Intranet site.

2. Course Registration

New, incoming graduate students are pre-registered for a standard course schedule specific to their degree program during their first semester of enrollment. In subsequent semesters, students, in consultation with their academic/thesis advisor may select courses in their program of study from a list of course offerings for the upcoming semester. Course offerings for an upcoming semester are typically made available to students through the Registrar's office approximately 2 months prior to the start of the semester. Graduate students must complete course registration on-line through the Registrar's office on the ACPHS intranet site. Registration is typically completed in the preceding April for fall semester course enrollment, in November for spring semester enrollment and in March for summer session course enrollment.

3. Graduate Course Listings and Course Offerings

Graduate courses (required and elective) must be approved by the Graduate Curriculum Committee (GCC) and the full Graduate Faculty before they can be offered. Each program has procedures in place for review and approval of course proposals by graduate faculty. Approved graduate courses are listed in the College catalog and in Appendix D. Each graduate course has name, a 3-letter designation indicating the general course discipline (i.e., PSC is Pharmaceutical Sciences)

followed by a 3-digit number and the letter G to indicate the level of the course. Graduate courses are numbered as 600 or higher. Graduate courses numbered as 600-699 are designated as introductory or first year graduate courses, courses numbered 700-799 are considered to be intermediate/advanced graduate courses. Graduate credit is only awarded for courses numbered as 600 level or higher. Graduate students do not receive graduate credit for undergraduate courses (400 or lower). All graduate courses listed in the College catalog are not offered every academic semester or summer session. The Registrar's office publishes and posts on the Registrar's website, the graduate courses that will be offered in the upcoming semester.

F. Transfer Credits

Up to nine (9) credit hours of graduate level coursework may be transferred to ACPHS from other accredited academic institutions, subject to the approval of the Program Director and the Dean of the School of Graduate Studies. To be considered for transfer credit, courses must have been taken in the past seven (7) years. Only courses where applicants have earned grades of B (83; B- is not accepted) or higher will be considered for transfer credit. Courses graded on a pass/fail basis will not be accepted for transfer credit. A request for awarding of transfer credit along with official transcripts of the coursework must be submitted to the School of Graduate Studies, at least one month prior to the start of the graduate program at ACPHS for consideration of transfer credit. The request will be reviewed by the Program Director and faculty with expertise in the course area, and they will make a recommendation to the Dean regarding the request. The Dean will make the final decision and inform the student, Program Director and the Registrar's office.

VII. Thesis Requirements

All graduate students enrolled in a thesis-bearing graduate program must complete thesis research as part of their required culminating experience. The guidelines below describe the process for 1) selecting a thesis advisor, 2) selecting a thesis committee, 3) developing a thesis project, 4) preparation and approval of the thesis proposal, 5) writing the thesis, 6) thesis defense, and 7) submitting the thesis to the School of Graduate Studies.

A. Academic and Thesis Advisor

Graduate students are assigned an interim academic advisor by the Program Director upon arrival at the College. Interim academic advisors are available to assist students with course registration and other program questions until the student has selected a permanent academic or thesis advisor. Graduate students may request, from the Program Director that the interim academic advisor become his or her permanent advisor. Alternatively, graduate students may select a different faculty member as his or her permanent academic/thesis advisor. Students must select the permanent academic advisor by the end of the first semester.

Graduate students enrolled in thesis programs are encouraged to select a permanent thesis advisor as early in their program of study as possible, ideally within the first

month of enrollment in the program but no later than the end of the first academic semester. During the graduate student orientation session, graduate students are provided with a listing of graduate faculty available to serve as thesis advisors for each graduate program. Graduate students are encouraged to set up individual meetings with faculty to discuss possible research projects. Some graduate programs require students to enroll in a Research Rotation course designed to assist students with selecting a permanent thesis advisor. Thesis advisors must be members of the Research Graduate Faculty for a thesis graduate program and must be approved by the Program Director.

B. Thesis Committees

Students enrolled in thesis graduate programs must establish a Thesis Committee. The Thesis Committee is composed of at least three members, including the Thesis Advisor, who serves as Chair of the committee. The Thesis Advisor, in consultation with the student, identifies appropriate members of the Thesis Committee. Thesis committee members should have expertise in a discipline related to the student's thesis research. The Thesis Committee must be approved by the Program Director and the Dean of the School of Graduate Studies. For most programs, Thesis Committee members are ACPHS Graduate Faculty. However, external faculty or other individuals with expertise related to the thesis project may serve on thesis committees for some graduate programs with approval of the Program Director and Dean of the School of Graduate Studies. The Thesis Committee is responsible for approving the thesis proposal, periodically monitoring the student's progress in his or her thesis project, and approving the final thesis and thesis examination (defense). See the SGS intranet site for the Thesis Committee Approval form.

C. Thesis Proposal and Progress Reports and Meetings

Graduate students enrolled in thesis graduate programs must prepare a Thesis Proposal as part of their thesis research project. The Thesis Proposal outlines, in detail, the student's proposed thesis research project. The written Thesis Proposal is prepared by the student, in consultation with his/her Thesis Advisor. Each program establishes its own timeline for completion of the Thesis Proposal. However, the Thesis Proposal is typically completed during the second academic semester and *at least* one year before thesis defense. The format of the thesis proposal similar to guidelines used for preparation of the thesis and grant proposals for submission to extramural funding agencies such as the National Institute of Health or the National Science Foundation.

Once the student completes the thesis proposal to the satisfaction of the thesis advisor, it is presented to the Thesis Committee for review. Typically the student provides the written proposal to the Thesis Committee and allows a minimum of two weeks for the committee to review the document. Once reviewed, a meeting with the committee to formally present the proposal is scheduled. The Thesis Committee may require changes to the proposal. The Thesis Proposal must be approved by the Thesis Committee and the Program Director. Upon presentation and approval of the thesis proposal to the thesis committee, the student must submit a completed and signed thesis approval

form to the School of Graduate Studies. Forms are available in the office of the School of Graduate Studies and on the SGS intranet site.

Students are required to meet with the Thesis Committee at least once per semester, and at least twice, after the thesis proposal has been approved. These periodic progress meetings are designed to help the student progress in the thesis work and keep the committee informed of any changes or problems encountered in the project. In these meetings the committee may make useful suggestions and assist students with overcoming challenges in the work and to help keep the student on track with degree completion.

D. Thesis

Upon completion of the research project to the satisfaction of the student's thesis advisor and Thesis Committee, the student must submit a formal thesis based on the research as part of the degree requirement. The thesis and abstract must be prepared in a style and format specified by the guidelines in Appendix D. The document must first be reviewed and critiqued by the thesis advisor, and revisions are provided to the student. The thesis advisor is responsible for ensuring that the thesis meets the style and format requirements. Once the thesis advisor is satisfied with the thesis, the thesis is forwarded to the thesis committee for review. The Thesis Committee should be given at least two weeks to review the thesis. If deemed necessary the Thesis Committee may decide if the student must make revisions in the document(s) and/or perform further work in order to satisfactorily complete the research project. The Thesis Committee will then pass their comments and suggested revisions back to the Thesis advisor and the student, who will then make the necessary revisions. The student's research advisor will examine the revised document to ensure that the student has made the necessary revisions. The Thesis Committee must certify by a minimum of two-thirds affirmative vote of its membership that the document is ready for the thesis examination. *Students must be registered for at least one research credit during the semester in which the thesis is being evaluated and defended.*

E. Scheduling the Thesis Defense

The thesis must be written and approval must be granted by the thesis advisor and committee to schedule the defense. Students must also have completed all didactic coursework for the degree before the thesis defense can be scheduled. Once the student's Thesis Advisor and Thesis Committee reviews the thesis document and determines that the student is ready for the thesis defense, the thesis advisor requests approval for scheduling the thesis defense of the Program Director and the Dean of the School of Graduate Studies. The Office of Graduate Studies requires two weeks' notice for the scheduling of the thesis defense to ensure the presentation date and time is adequately advertised to the College community. The Dean of the School of Graduate Studies completes a degree audit to ensure that all coursework is complete. If the coursework is complete, the Dean will inform the Program Director, thesis advisor and student that the thesis defense may be scheduled. The thesis defense should be held in a location and at a time that allows all members of the College community involved in

graduate education to attend the thesis presentation. Once a date, time and location has been determined by the student, thesis advisor and Program Director, the thesis presentation will be advertised by the Office of Graduate Studies to the entire College community (students, faculty administration) through email announcements and flyers posted around campus.

F. Thesis Defense (Examination)

The final thesis examination is an oral defense of the student's research and is also designed to establish the competency of the student in his/her major or related field. The Thesis Committee, chaired by the student's thesis advisor, moderates the final examination. All members of the Thesis committee must be present at the final thesis examination. The final examination is structured in two parts. The first part is open to all members of the College community (students, faculty, administrators). The second part of the examination is restricted only to members of the Thesis committee.

In the first part of the examination, the student gives a formal presentation to explain his/her work and conclusions reached in the thesis work. Typically this presentation is 45-60 minutes long. Once the presentation is complete, members of the general audience (not the thesis committee) are given the opportunity to ask question of the student. When the chair determines there are no further substantive questions from the general audience, he or she will close the public part of the final examination and dismiss everyone except the student and the members of the Thesis committee. This second portion of the thesis defense is where the examination of the student's ability occurs. The committee asks the student specific questions regarding the research, methods used, interpretation of the results, the basis of the student's conclusions, and the general significance of the work. The purpose of this part of the thesis examination is to help the committee determine if the student has a complete and thorough understanding of the work presented in the thesis. This portion of the thesis examination is typically 45-60 minutes long. The student will then be excused and the committee will then deliberate and vote on whether or not the thesis and final examination fulfills the requirements for the graduate degree. Only members of the Thesis Committee are eligible to vote, and at least two-thirds of the members of the Thesis Committee must cast affirmative votes in order to for the student to pass the thesis examination.

If the committee passes the student but decides that minor modifications of the thesis are required, the student must make these modifications and present them to his/her research advisor ***within two weeks of the date of the thesis defense.*** The Thesis advisor must certify in writing to the Program Director and the thesis committee members that the student has satisfactorily performed the required modifications.

If the final examination results in failure, the student will be provided with a written report prepared by the Thesis committee with copies to the Program Director and the Dean of the School of Graduate Studies outlining reasons for the failure and suggestions which may help to resolve the failure. The student is entitled to a second examination

which may only be scheduled after the Thesis advisor certifies in writing to the Program Director that the student has resolved the problems which resulted in the failure. Failure of the second final examination will result in the student being dismissed from the graduate program without the graduate degree.

G. Submitting the Thesis to the School of Graduate Studies

The thesis, including the title page of the thesis, signed by the thesis committee members, is then submitted electronically (as a pdf file) to the School of Graduate Studies through the UMI Dissertation Service (website for upload and binding: www.etsdadmin.com/acphs). The final thesis is reviewed by SGS to determine that the thesis conforms to the style and formatting guidelines outlined in Appendix D. Students will be informed if additional revisions are required. Once the thesis is cleared by the Office of Graduate Studies, the thesis is sent for binding. Students are responsible for the costs of binding and are required to provide one bound copy to the thesis advisor, one bound copy to SGS, and one bound copy to the library. Students may have additional copies bound if they chose. Official bound copies of the thesis are delivered to the Office of Graduate Studies and distributed by SGS to the advisor and library. The student's personal copies may be directly sent to an address of their choice.

VIII. Graduate Academic Standards

All graduate students are required to meet institutional academic standards for graduate education. Individual graduate programs may impose additional or more stringent academic standards. Graduate student progress is reviewed by the Dean of the School of Graduate Studies to determine students' academic status at the end of each academic semester. The Dean of the School of Graduate Studies identifies students in good academic standing and those in danger of probationary status or dismissal and refers these students to the Graduate Academic Standards Committee for recommendations regarding academic standing. A student may not graduate while on probationary status.

A. GPA and Grade Requirements

To be in good academic standing, graduate students must have a cumulative GPA of 3.0 or higher and be free of any academic probationary status. Graduate students must also demonstrate satisfactory progress in thesis research, capstone or clinical practicum as documented by recommendations from the thesis/academic advisor and the grades of related thesis courses to be considered in good academic standing. All courses, whether accepted toward graduation credit or not, are recorded on a student's transcript and count in GPA calculations.

- *Required Courses:* Students must earn a grade of B or better in all required graduate courses. If less than a B is earned, the course must be remediated.
- *Elective Courses:* Students are permitted only one grade in the range of B- to C- in elective courses. If less than a C- is earned, the student must remediate the elective course or take a different elective.

B. Thesis Progress

All students enrolled in thesis track graduate programs are required to make satisfactory progress on their thesis research. A recommendation for probation due to unsatisfactory progress in thesis research may be initiated by the Program Director or the student's thesis advisor if it is determined that student's performance is unsatisfactory regardless of the student's grade-point average. Recommendations for probation due to unsatisfactory progress in thesis research are made in writing by the Thesis advisor or Program Director to the Dean of the School of Graduate Studies.

C. Academic Probation

A graduate student will be placed on academic probation for any of the following reasons.

- semester GPA falls below 3.0
- receives a grade in a required course below B
- receives a grade of B- or below in any elective course; or
- unsatisfactory progress towards completion of the degree.

A recommendation for academic probation due to unsatisfactory progress in thesis research or capstone project may be initiated by the student's advisor if the advisor considers a student's performance to be unsatisfactory irrespective of a student's grade point average. Recommendations for probation are made to the Dean of the School of Graduate Studies. The Dean forwards the recommendation to the Graduate Academic Standards Committee and the committee, in consultation with the Dean, makes decisions regarding probation. Students placed on academic probation will be informed by the office of the Dean of the School of Graduate Studies. Probationary status regarding graduate students will be communicated to the student's academic advisor, the Program Director, the Dean of Students and the Registrar's office by the Dean of the School of Graduate Studies.

Students placed on academic probation remain on probation for a minimum of one academic semester. While on academic probation a student is ineligible for student organization office, participation in intercollegiate athletics and service on College committees. In some cases, financial aid may be jeopardized. A student may not graduate while on academic probation.

D. Removal from Probation

A student placed on academic probation due to a cumulative GPA below 3.0 or course grade below B must restore their semester GPA to 3.0 or above within one semester and the cumulative GPA to 3.0 within two semesters for full-time students, or 12 credit hours for part-time students, to be removed from probation. Students placed on probation due to one or more course grades below a C must remediate the course(s) prior to being removed from probation. Students placed on academic probation due to unsatisfactory thesis progress may be restored to good academic standing following notification by the advisor or Program Director to the Dean of the

School of Graduate Studies that the student is making satisfactory progress on his/her thesis research. Such notification must be received within two regular academic semesters. A student who is not restored to good academic standing by end of the specified time or credit hour requirement may be dismissed from the program. Students removed from academic probation will be informed by the Dean of the School of Graduate Studies.

E. Dismissal

A graduate student may be dismissed from a graduate program for any of the following reasons:

- Failure to correct deficiencies of academic probation in a timely manner (see above: *“Removal from Academic Probation”*)
- Two independent instances of being placed on academic probation.
- Two failures of the thesis defense or, for students enrolled in a non-thesis option, two failures of the capstone project.
- Receiving a grade of F in any required graduate course or grades below B in two or more required courses.
- Failure to meet Programmatic requirements in the time frame designation for program completion. Full-time graduate students must complete all graduate program degree requirements in 3 years or less. Part-time graduate students must complete all MS degree requirements in 7 years or less.

Students dismissed from a graduate program will be informed by the Dean of the School of Graduate Studies and the decision will be communicated to the student’s advisor, the Program Director, Dean of Students and the Registrar’s office

F. Appeal of Dismissal

A student who has been dismissed from a graduate program may appeal to the Dean of Graduate Studies for reinstatement. The appeal must be made in writing within 14 consecutive days after receipt of the notice of dismissal. The appeal will be reviewed by the Graduate Academic Standards Appeals Committee appointed by the Dean. The committee will make a recommendation of the appeal to the Dean. The Dean will review the appeal and recommendation from the Graduate Academic Standards Appeals Committee. The decision of the Dean is final and will be communicated in writing to the student, the Graduate Academic Standards Appeals Committee, the Graduate Academic Standards Committee, the academic/thesis advisor, the Program Director, and the Registrar.

IX. Graduation and Degree Completion

A. Time Duration to Complete the Degree

All requirements for a Master of Science degree must be completed within three calendar years, for full-time students, or seven years, for part-time students. Students who fail to complete requirements for a graduate degree within the specified time period will be dismissed from the program. A student may petition

for a time extension. The petition must include a plan for completion of the degree and letters of support from the academic/thesis advisor and Program Director and must be approved by the Dean of the School of Graduate Studies.

B. Expiration of Graduate Courses

Graduate courses, either taken at ACPHS or for transfer credit from another academic institution, are valid for no more than seven years. Students will be required to repeat courses completed more than seven years earlier, before finishing the requirements for a degree.

C. Graduation Requirements

Candidates for the Master of Science degree must satisfy all of the academic requirements of the program. The Dean of the School of Graduate Studies verifies that graduate students have completed all degree requirements. Students must complete all of the required paperwork for application for graduation by the designated deadlines (See the Academic Calendar). Approval for conferral of the degree is made by a majority vote of the Graduate Faculty on the recommendation of the Dean of the School of Graduate Studies. All degree requirements must be completed in order for students to receive their diploma.

Diplomas are awarded three times during the calendar year, in May, August and December. Commencement ceremonies are held once per year, in May. Graduate students must complete all degree requirements to be eligible to receive their diploma. In addition, graduate students must submit a completed and signed Application for Graduation by the required deadlines (see the academic calendar) in order to graduate and receive their diplomas by the designated dates. Students enrolled in thesis-track programs must have a scheduled thesis defense date at the time of Application for Graduation.

APPENDIX A: Curricula for MS Programs

A. MS, CLINICAL LABORATORY SCIENCES (MSCLS)

YEAR 1 FALL			YEAR 1 SPRING		
Code	Course Name	Credits	Code	Course Name	Credits
CLS 610	Clinical Microbiology I	4	CLS 660	Immunoematology	4
CLS 655	Urinalysis and Body Fluids	2	CLS 640	Clinical Chemistry	4
CLS 650	Clinical Hematology and Hemostasis	4	CLS 620	Clinical Microbiology II	4
ETH 610	Ethics in Resarch	1	BIO 650	Research Design	2
PSC 672	Experimental Design and Data Analysis	2	CLS 630	Clinical Immunology	4
Total Credits		13	Total Credits		18
YEAR 2 FALL			YEAR 2 SPRING		
Code	Course Name	Credits	Code	Course Name	Credits
CLS 770	Clinical Practicum I	9	CLS 780	Clinical Practicum II	9
BHS 740	Genetics/Molecular Basis of Disease	4	BHS 745	Molecular Diagnostics	3
BHS 730	Advanced Good Laboratory Practices and Lab Mgmt	3	CLS 760	Clinical Correlations	3
			BHS 790	Capstone	3
Total Credits		16	Total Credits		18

B. MS, HEALTH OUTCOMES AND INFORMATICS (MSHOI)

FALL YEAR 1			SPRING YEAR 1		
Code	Course Name	Credits	Code	Course Name	Credits
HRI 610	Quantitative Regression Analysis	3	HRI 625	Health Systems	3
HRI 615	Health Outcomes	3	HRI 635	Statistical Programming	3
MAT 610	Statistical Inference and Modeling	3	HRI 645	Epidemiology	3
Total Credits		9	Total Credits		9
FALL YEAR 2			SPRING YEAR 2		
Code	Course Name	Credits	Code	Course Name	Credits
HRI 655	Health Economics	3	XXX	Elective	3
HRI 665	Health Informatics	3	XXX HRI 750	Elective (T) or Capstone (NT)	3
HRI 761	Thesis Research (T) or Elective (NT)	3	HRI 761 HRI 751	Thesis Research (T) or Industry Practicum (NT)	3
Total Credits		9	Total Credits		9

C. MS, CYTOTECHNOLOGY/MOLECULAR CYTOLOGY (MSCMC)

YEAR 1 FALL			YEAR 1 SPRING		
Code	Course Name	Credits	Code	Course Name	Credits
CYT 610	Cytopathology of Female Genital Tract	4	CYT 630	Exfoliative Non-Gynecologic Cytopathology II	2
CYT 620	Exfoliative Non-Gynecologic Cytopathology I	2	CYT 650	Cytopreparatory Techniques II	1
CYT 640	Cytopreparatory Techniques I	1	CYT 660	Fine Needle Aspiration Cytology I	3
BHS 610	Cellular Pathophysiology and Histology I	3	BHS 620	Cellular Pathophysiology and Histology II	3
BHS 740	Genetics/Molecular Basis of Disease	4	BHS 765	Grand Rounds in Pathology	1
ETH 610	Ethics in Research	1	BHS 745	Molecular Diagnostics	3
PSC 672	Experimental Design and Data Analysis	2	BIO 650	Research Design	2
BHS 730	Advanced Good Laboratory Practices/Lab Management	3			
Total Credits		20	Total Credits		15
SUMMER SESSION 1			SUMMER SESSION 2		
CYT 670	Fine Needle Aspiration Cytology II	3	CYT 770	Clinical Practicum I	3
BHS 750	Flow Cytometry	3	BHS 760	Advanced Topics in Biotechnology- Student's FNA Portfolio	3
BHS 755	In Situ Hybridization-Principle, protocol and applications	2			
Total Credits		8	Total Credits		6
YEAR 2 FALL					
Code	Course Name	Credits			
CYT 780	Clinical Practicum II	6			
BHS 790	Capstone Project	3			
Total Credits		9			

D. MS, MOLECULAR BIOSCIENCES (MSMBS)

YEAR 1 FALL			YEAR 1 SPRING		
Code	Name	Credits	Code	Name	Credits
BIO 625	Advanced Molecular Biology	3	BIO 650	Research Design/Thesis Proposal	2
ETH 610	Ethics in Research	1	BIO 660	Journal Club	1
MAT 610	Statistical Inference and Modeling	3	BIO630	Advanced Cell Biology	3
BIO 670	Research Rotation	2		Elective	3
Total Credits		9	Total Credits		9
YEAR 2 FALL			YEAR 2 SPRING		
Code	Name	Credits	Code	Name	Credits
XXX	Elective	3	XXX	Elective	3
BIO 701	Thesis Research	3	BIO 701	Thesis Research	3
XXX	Elective	3			
Total Credits		9	Total Credits		6

E. MS, PHARMACEUTICAL SCIENCES (MSPS)*Thesis Track (Pharmacology (PCOL) or Pharmaceutics (PCEU) Concentration)*

YEAR 1 FALL			YEAR 1 SPRING		
Code	Name	Credits	Code	Name	Credits
PSC 631	Foundations of Pharmaceutical Sciences	3	PSC 635 OR PSC 645	Pharmacological Regulation of Signal Transduction (PCOL) Drug Delivery Principles (PCEU)	3
ETH 610	Ethics in Research	1	PSC 651	Pharmaceutical Sciences Journal Club	1
PSC 672	Experimental Design and Data Analysis	2	PSC 636 OR PSC 741	Systems Pharmacology: Neural Systems (PCOL) Pharmacokinetic Modeling (PCEU)	3
PSC 661	Research Rotation	2	PSC 761	Thesis Research	3
PSC 651	Pharmaceutical Sciences Journal Club	1			
Total Credits		9	Total Credits		10
YEAR 2 FALL			YEAR 2 SPRING		
XXX	Elective	3	XXX	Elective	3
XXX	Elective	3	PSC 761	Thesis Research	2
PSC 761	Thesis Research	3			
Total Credits		9	Total Credits		5

Non-Thesis Track (Pharmacology (PCOL) or Pharmaceutics (PCEU) Concentration)

YEAR 1 FALL			YEAR 1 SPRING		
Code	Name	Credits	Code	Name	Credits
PSC 631	Foundations of Pharmaceutical Sciences	3	PSC 635 OR PSC 645	Pharmacological Regulation of Signal Transduction (PCOL) Drug Delivery Principles (PCEU)	3
ETH 610	Ethics in Research	1	PSC 651	Pharmaceutical Sciences Journal Club	1
PSC 672	Experimental Design and Data Analysis	2	PSC 636 OR PSC 741	Systems Pharmacology: Neural Systems (PCOL) Pharmacokinetic Modeling (PCEU)	3
XXX	Elective	2	XXX	Elective	2
PSC 651	Pharmaceutical Sciences Journal Club	1			
Total Credits		9	Total Credits		9
YEAR 2 FALL			YEAR 2 SPRING		
XXX	Elective	3	XXX	Elective(s)	3
XXX	Elective	3	PSC 750	Capstone	3
XXX	Elective	3			
Total Credits		9	Total Credits		6

APPENDIX B: GRADUATE ASSISTANTSHIPS

A. GRADUATE RESEARCH ASSISTANTSHIP PROGRAM

Introduction

The School of Graduate Studies sponsors graduate student research assistantships (GRA) that are financial awards to help support students as they work on their thesis research projects. Full-time graduate students enrolled in thesis-bearing programs who have completed at least one academic semester as a graduate student at the College, and who are in good academic standing are eligible to apply for these assistantships. Graduate students receiving assistantships are required to work as a condition of the assistantship for a minimum of 10 hours per week, but no more than 20 hours per week and must maintain satisfactory academic progress toward degree completion. Students receiving the GRA are also required to attend all research seminars on campus. Graduate assistantships are awarded for one academic semester or year with review for continued eligibility at the end of each academic semester. Renewal of an assistantship award is dependent on availability of funds, assessment of student academic performance and on how the student performed in the position. Non-thesis students are eligible to receive Graduate Teaching Assistantships but are not eligible for Graduate Research Assistantships. *Students receiving financial support from other sponsoring agencies, or those receiving an SGS sponsored Teaching Assistantship are not eligible for the GRA.* Graduate student assistantships are paid on an hourly basis. Graduate Research Assistants (GRA) work directly with a faculty member on a research project associated with the student's degree program (i.e., thesis). Graduate students are expected to be actively engaged and working on their thesis project as part of the award. Students working solely on writing the thesis are not eligible. Graduate students may receive awards for up to three academic semesters.

The primary duties of a research assistant may include:

- Conducting experiments and generating original data
- Collecting and analyzing data
- Collaborating in the preparation of research publications and presentations
- Conducting library research
- Presenting research data

GRA awards are merit-based and made on a competitive basis. Awards typically will range from \$2500-3000 per semester and will be made to highly qualified applicants.

Eligibility for Graduate Student Research Assistantships

Applicants for the assistantships must possess the following minimum qualifications to be eligible for the position:

1. *Full-time student in good academic standing.* Full-time status is defined as 9 or more credit hours of graduate coursework or thesis, or be registered for remaining course or thesis work in the final semester of the degree. Part-time students and students on probationary status are not eligible. Students working solely on writing the thesis are not eligible. Students must have a minimum GPA of 3.0 or higher and be making satisfactory progress on their thesis project.

2. *Complete a student assistantship application.* Graduate students requesting an assistantship must complete an application. The application includes the completed and signed application form, an updated Program of Study, a CV, a personal statement (include the following: qualifications for the position, reasons for applying for the assistantship, a statement of personal goals as they relate to the these program and graduate program), timeline for the thesis project and a letter of recommendation from the thesis advisor.
3. *Proficiency in English.* Eligible students must have satisfactory English proficiency consistent with the job responsibilities. This may be demonstrated in an interview and through assessment of the TOEFL or ILETS score.

Applying for a Graduate Student Assistantship

Applications for Graduate Research Assistantships are submitted to the Dean of the School of Graduate Studies. The application must be completed and compiled into a single pdf file and submitted electronically to the School of Graduate Studies (Martha.hass@acphs.edu). The student must also arrange to have the letter of recommendation from his/her thesis advisor submitted to the School of Graduate Studies on their behalf. For spring awards, completed applications, including letters of recommendation must typically be received by **January 20**. Incomplete or late applications are not accepted.

Application for Graduate Research Assistantship

Eligible students, in consultation with their thesis advisors may submit *electronic* applications (single pdf file) to receive a GRA award. Applications must include:

- Completed and signed application form.
- Current, completed and signed Program of Study
- CV and Personal Statement
- Timeline for the thesis project with expected date of project completion
- Letters Support/Recommendation from the Thesis advisor.

The application must be compiled into a single pdf file and submitted electronically. Incomplete applications or applications not complying with this format will not be considered for funding. Applications will be reviewed by Program Directors and the Dean.

Graduate Student Research Assistantship Appointment Letters

Applicants (and their thesis advisors) identified to receive awards will be informed by the Dean of the School of Graduate Studies The Dean of the School of Graduate Studies prepares the Graduate Assistantship appointment letters and sends the letter and an acceptance of award form to the student for review and signature. The letter contains the terms, pay and duration of the assistantship. Graduate students return a signed copy of the contract letter to the Dean of the School of Graduate Studies no later than 1 week after receipt of the appointment letter. The Dean of the School of Graduate Studies coordinates employment paperwork with the Office of Financial Aid to generate electronic timesheets for the student that are approved by SGS. Students must complete all employment paperwork including an I-9 form to verify identity and employment eligibility and a W-4 form to declare tax withholding information.

B. GRADUATE TEACHING ASSISTANTSHIPS

Introduction

The School of Graduate Studies sponsors graduate student teaching assistantships (GTA) that are financial awards to help support students as they work on their degree program. Full-time graduate students who are in good academic standing are eligible to apply for these assistantships. For some highly qualified graduate students, a teaching assistantship may be offered as part of an offer of admission to enroll in a graduate program at ACPHS. Students hired to fill teaching assistantships must meet appropriate qualifications and skills to fulfill the job responsibilities of the position. Graduate students receiving assistantships are required to work as a condition of the assistantship for up to 20 hours per week and must maintain satisfactory academic progress toward degree completion. Graduate teaching assistantships are awarded for one academic semester or year with review for continued eligibility at the end of each academic semester. Renewal of an assistantship award is dependent on availability of funds, assessment of student academic performance and on how the student performed in the position. *Students receiving financial support from other sponsoring agencies, or those receiving an SGS sponsored Graduate Research Assistantship are not eligible for the GTA.* Graduate student assistantships are paid on an hourly basis. Graduate Teaching Assistants (GTA) work directly with a faculty member in a course. Specific job responsibilities vary based on the course and the faculty instructor. Graduate students may receive GTA awards for up to three academic semesters.

The primary duties of a graduate teaching assistant may include:

- Preparing and/or delivering lectures in a didactic course, laboratory or workshop
- Preparing laboratory experiments and/or supervising students in a lab or classroom
- Preparing and grading tests, quizzes, presentations or other assignments
- Holding office hours or student conferences
- Proctoring exams and quizzes
- Grading tests, quizzes or other assignments
- Tutoring and facilitating review sessions
- Assisting with developing instructional materials

GTA awards are merit-based and made on a competitive basis. Awards typically range from \$1500-2000 per semester.

Eligibility for Graduate Student Teaching Assistantships

Applicants must discuss GTA openings with faculty teaching the course. Eligibility for the assistantships include the minimum qualifications:

- *Full-time student in good academic standing.* Full-time status is defined as 9 or more credit hours of graduate coursework or thesis, or be registered for remaining course or thesis work in the final semester of the degree. Part-time students and students on academic probation are not eligible. Students must have a minimum GPA of 3.0 or higher and thesis students must be making satisfactory progress on their thesis project.

- *Complete a student assistantship application.* Graduate students requesting an assistantship must complete an application. The application includes the completed and signed application form, an updated Program of Study (continuing students only, not required for new G1 students), a CV, a personal statement (include the following: qualifications for the position, reasons for applying for the assistantship, a statement of personal goals as they relate to the graduate program) and a letter of recommendation/support from the faculty member responsible for the course.
- *Proficiency in English.* Eligible students must have satisfactory English proficiency consistent with the job responsibilities. This may be demonstrated in an interview and through assessment of the TOEFL or ILETS score.

Applying for a Graduate Student Assistantship

Applications for Graduate Teaching Assistantships are submitted to the Dean of the School of Graduate Studies. The application must be completed and compiled into a single pdf file and submitted *electronically* to the School of Graduate Studies (martha.hass@acphs.edu). The student must also arrange to have the letter of recommendation/support submitted to the School of Graduate Studies on their behalf by the faculty member teaching the course. Completed applications for the Fall semester, including letters of recommendation, are typically due by late August. Incomplete or late applications will not be accepted.

Application for Graduate Teaching Assistantship

Eligible students, in consultation with faculty instructor may submit *electronic* applications to receive a GTA award. Applications must include:

- Completed and signed application form.
- Current, completed and signed Program of Study (continuing students only)
- CV and Personal Statement
- Letters Support/Recommendation from faculty instructor.

The application must be compiled into a single pdf file and submitted electronically. Incomplete applications or applications not complying with this format will not be considered for funding.

Graduate Student Teaching Assistantship Appointment Letters

Applicants (and the faculty instructor) selected to receive awards will be informed by the Dean of the School of Graduate Studies. The Dean of the School of Graduate Studies prepares the Graduate Teaching Assistantship appointment letters and sends the letter and an acceptance of award form to the student for review and signature. The letter contains the terms, pay and duration of the assistantship. Graduate students return a signed copy of the contract letter to the Dean of the School of Graduate Studies no later than 1 week after receipt of the appointment letter. The Dean of the School of Graduate Studies coordinates employment paperwork with the Office of Financial Aid. Students must complete all employment paperwork including an I-9 form to verify identity and employment eligibility and a W-4 form to declare tax withholding information. Students are required to log hours using the ACPHS on-line system and approval of hours is done by SGS.

APPENDIX C: Course Descriptions

BIOMEDICAL AND HEALTH SCIENCES (BHS)

BHS 790 (formerly BHS 600) Capstone. The capstone project is an integrative activity with a variety of final products based on the degree program and type of project undertaken. It is an opportunity for a student to explore an area of particular interest and to gain additional training in one or more areas of the diagnostic laboratory. The scope of the projects will vary based on the clinical site or investigators involved and may include but not limited to clinical correlations, an exhaustive case study presentation, research laboratory projects, new technique verification studies, epidemiologic/infection control analysis and continuing education presentation (written and oral) on emerging disease or technologies. The common elements for each project is the production of a high quality project (research project or exhaustive case studies), the requirement for oral presentation of the final project and review by a committee of three faculty members. (3)

PRE-REQUISITES:

BHS 610; BHS 620 Cellular Pathophysiology and Histology I and II. These courses survey the biochemical and molecular mechanisms underlying disease processes and precipitating cellular change and death. Events of cellular energetics, signaling, gene expression and mutations will be highlighted. The morphological, pathological and clinical correlates of these cellular events will be presented after a histological foundation is established. Basic concepts of cell swelling, inflammation, atrophy, apoptosis, necrosis, dysplasia, anaplasia and neoplasia will be illustrated and identified through microscopy. Once principles are established, a systems approach is taken to demonstrate system-specific pathology.

(3 each)

PRE-REQUISITES:

BHS 739 (formerly BHS 630) Advanced Good Laboratory Practices and Laboratory Management. This course provides training in the principles of good laboratory practice for personnel of laboratories who wish to produce test results that are fit for the purpose and which would stand up to the scrutiny of inspection. This allows for the reliability, retrieval and accountability for test results. These procedures are applicable to diagnostic laboratory procedures, research, forensic and in the drug safety and development sector. Topics include safety, Clinical Laboratory Improvement Act of 1988 (CLIA) government regulations, and quality assurance in the laboratory. Students will learn and apply management and quality assurance skills and concepts applicable to different laboratory settings, including specimen collection, and performance per CLIA'88-and /or moderate-complexity testing. Students will also demonstrate competency in a wide variety of techniques used to collect, process and test specimens. (3)

PRE-REQUISITES:

BHS 740 (formerly BHS 650 Molecular Genetics and Genomics) *Genetics and Molecular Basis of Disease.* This course lays down the foundation in basic genetic concepts with the objective of understanding the heritability and/or molecular basis of disease. Recent evidence and diagnostic procedures suggest that genetic diseases make up a large proportion of the total disease burden in both pediatric and adult populations. Today's health care practitioner and biomedical scientist must understand the science of medical genetics and the consequences of altered genomics and proteomics. Advances in the development of new and more accurate methods of diagnosing hereditary disease have led to a greater "genetic awareness" and recognition that genetics plays a role in all areas of medicine. Using a wide spectrum of examples it will illustrate the impact of mutations as found in thalassemias, sickle cell anemia, cystic fibrosis, familial Amyotrophic Lateral Sclerosis and Huntington's Disease as causes of disease. It will also discuss genetics as a predisposing factor, such as in the case of birth defects, breast cancer, Alzheimer's Disease, alcoholism and some autoimmune disorders. Environmentally-induced mutagenesis and carcinogenesis and the role of oncogenes and tumor suppressor genes will be a particular focus of the second half of the course. Lecture and Lab (4)
PRE-REQUISITES: CHE 311/312 or equivalent

BHS 745 (formerly BHS 660) Molecular Diagnostics. This course is an application of molecular concepts to the identification and of infectious agents, genetic risk of disease, presence and/or occurrence of mutations as a consequence of infections or toxic exposure. The use of genomic profiles as biomarkers associated with cancer and cancer risk, autoimmunity and hereditary disorders, as well as determination of histocompatibility will be discussed and performed. Biotechnology as a diagnostic and investigative tool will be discussed. In the laboratory students will learn and perform basic molecular techniques such as DNA and RNA isolation, RT-PCR, Northern and Southern blots. Students will also be exposed to the utility of microarrays and bioinformatics in medicine. (4)
PRE-REQUISITES:

BHS 750 (formerly BHS 670) Flow Cytometry. This course introduces the principles and applications of flow cytometry through lectures and laboratory/group work. Major topics include: machine set-up and operation, fluorochromes and fluorescence, spectral overlap and compensation, experimental design, data collection and multi-parameter analyses, immunophenotyping, research application, clinical applications and disease diagnosis. (3)
PRE-REQUISITES:

BHS 755 (formerly BHS 675) In situ Hybridization. This course is an introduction to the theory and application of molecular hybridization and in situ hybridization techniques. Selection of probes, their application and appropriate detection systems will for both RNA and DNA in situ hybridization techniques will be discussed in lecture and laboratory. A focus of the course will be the applications of hybridization techniques to the diagnosis and prognosis of human disease. (2)
PRE-REQUISITES: BHS 650 or PSC 312

BHS 760 (formerly BHS 690) *Advanced Topics in Biotechnology* (also known as the Fine Needle Aspiration (FNA) Portfolio). This course is an independent project required by students in the MS in Cytotechnology and Molecular Cytology Program. The students, under clinical preceptor and faculty advisement, compile FNA specimens from clinical rotations and create a presentation of case studies. Each case study includes patient history, cytologic and histologic findings, photographic images of the cases, ancillary testing results, and information on the entity involved. This project allows students to participate in various laboratory activities and strengthens their training. Only cytotechnology students, who have successfully completed training on campus and are in the clinical rotation phase of the program, are eligible. **(3)**

BHS 765 (formerly BHS 830) *Grand Rounds in Pathology*. Case presentations and discussion in surgical pathology, forensics, and radiation oncology in the medical grand rounds format. This one credit course will have a series of sessions with pathologists and/ or other specialty physicians from hospitals in the Capitol District presenting a series of interesting cases. The presentations will illustrate patient symptomatology, the entire process of diagnostics and patient management and clinical outcomes thus integrating diagnostic testing and their critical role in optimal patient outcomes. **(1)**

PRE-REQUISITES:

BHS 790 (formerly BHS 600) *Capstone*. The capstone project is a culminating experience blending all aspects of diagnostic laboratory practice and clinical research. Students will demonstrate the ability to read and analyze scientific literature, formulate case studies or project topics, prepare findings for oral presentation and complete a literature review with final paper or poster presentation.

BIOLOGY (BIO)

BIO 620 *Advanced Topics in Microbiology*. This course will explore various cutting-edge topics in Microbiology through Journal club style presentations of primary literature from high impact peer reviewed journals. Each session will begin with a brief overview of the background information by the instructor followed by critical evaluation of the paper through student presentations and group discussions, divided into four broad themes; 1) general microbial concepts including bacterial physiology and structure, metabolism and genetics, 2) microbial virulence mechanisms, anti-microbials, and antibiotic resistance mechanisms, novel prophylactic and therapeutic strategies for important bacterial infectious diseases, 3) the nature and biological activities of viruses, virus-host interactions and some important viral diseases and 4) important advances made in the field of host-pathogen interactions. Papers to be reviewed will be selected by the course instructor from high impact peer reviewed journals. Each session will begin with a brief introduction by the instructor, reviewing background information related to the theme discussion. Copies of the articles will be distributed to the class in advance, and students are expected to have thoroughly reviewed the assigned articles and to be able to present and discuss various aspects including the quality of data and the author's interpretation of the data and conclusions. **(3)**

PRE-REQUISITES: Permission of instructor

BIO 625 Advanced Molecular Biology (*formerly Molecular Genetics and Genomics*). An advanced treatment of genetics in microbial and animal systems, focused on the biochemical and molecular aspects of genetics structure and function. Information derived from current and recent genomic analyses and genomic comparisons will be included. This course will consist of both lectures and small discussion groups that delve more deeply into lecture material and primary scientific literature. (3)

PRE-REQUISITES: PSC 311/312 or CHE 312/313

BIO 630 Advanced Cell Biology. This graduate level course is designed to present foundational principles as well as cutting-edge developments in key areas of eukaryotic cell biology. Focusing on eukaryotic cell structure and function, topics will include: cellular structures and organelles; cell cycling; signal transduction; gene regulation; and intracellular trafficking. This course will consist of both lectures by faculty in their areas of expertise and small discussion groups that delve more deeply into lecture material and primary scientific literature. Students will be expected to demonstrate their knowledge of course material by participation in discussion groups and by examinations. (3)

PRE-REQUISITES: BIO 101/111, BIO 102/121. BIO 235 recommended

BIO 640 Toxicology. This course will provide students with a background in general toxicology and will focus specifically on the toxicology of drugs. The course introduction will include basic mechanisms of toxicity, cellular pathology, and a survey of environmental toxicology. The primary focus of the course will be on drug-induced renal, hepatic, dermatological, neurological, cardiovascular, developmental, and reproductive toxicology. Carcinogenic activity of drugs will also be presented. Examples of specific drug toxicity using case studies will be utilized in the course. Regulatory toxicology will also be addressed, as will typical approaches to preclinical and clinical toxicity risk assessment. (3)

PRE-REQUISITES: BIO 215 or PSC 321, CHE 202/221

BIO 650 Research Design. This graduate-level course will introduce students to the research methods used in the biological sciences. Topics to be covered include research design, data collection and documentation, critical literature review, preparation of a NIH-style grant application, and academic presentations and publications. Class discussions, workshops, and writing assignments will provide students with opportunities to both practice learned research methods as well as apply these methods toward the design of a potential thesis research project. (2)

PRE-REQUISITES:

BIO 660 Journal Club. This course is designed to enhance the ability of graduate students to critically evaluate scientific articles published in juried scientific journals. Articles will be selected from current scientific literature in a variety of disciplines in the molecular biosciences, including cell biology, molecular biology, medicinal chemistry biochemistry, microbiology, immunology and infectious diseases. All participants will read and critique the articles. Each student will present at least two articles per semester. (1)

PRE-REQUISITES:

BIO 670 *Research Rotation*. Students will complete two laboratory rotations of seven weeks each in order to facilitate the selection of a thesis research advisor. Students will select a potential mentor based on interests and availability of openings in any given lab. Assignments, based on student preferences, will be made by the program director. Students are expected to spend a minimum of 10 hours per week on laboratory research during the rotation. They are to meet with the faculty advisor at least one hour per week for basic introduction to laboratory principles and practices, and to discuss their research. Students are required to complete reading assignments as directed by the faculty advisor and write a report of the research data and present a ten minute talk summarizing their research at the end of the rotation. (2)

PRE-REQUISITES:

BIO 701 *Thesis Research*. The student will identify an appropriate area of research and a thesis advisor. The student will develop a research proposal. The specific topic and nature of the research will be determined by the student and thesis advisor. On receiving approval from the program director, a thesis committee will be established to act in an advisory capacity for the thesis proposal defense. On successful defense of the proposal the student will commence the research. Studies involving humans must be approved by the College's IRB. Studies involving animals must be approved by IAUCC. Projects involving data collection and management must adhere to GLP requirements. Once the work has been completed, the student will write and defend the thesis. (1-6)

PRE-REQUISITES:

CHEMISTRY (CHE)

CHE 623 *Methods in Spectroscopy*. This course covers the theoretical bases of IR, NMR and UV/visible spectroscopies and mass spectrometry with applications to the elucidation of the structure and function of organic molecules. Included are examples of spectroscopic analyses of stereochemistry, conformations and kinetics with emphasis on biomedical applications such as spectroscopic investigations of drug transport and metabolism. An overview of chromatographic methods and the coupling of these methods to spectroscopic analyses will also be discussed. (3)

PRE-REQUISITES: CHE 202/221

CHE 640 *Medicinal Chemistry I*. This course explores the fundamental principles that define the relationship between the chemical structure and biological action of drug molecules. A major focus of the course is the application of these chemical principles to predicting the pharmacodynamics and pharmacokinetics, with special emphasis on drug metabolism, and the molecular mechanisms of drug activity, drug resistance and drug synergism. Strategies for drug development, drug and prodrug design, and pharmacologic evaluation utilizing the concepts of qualitative and quantitative structure-activity relationships, biological screening assays, combinatorial chemistry, and computer-aided modeling are discussed. (3)

PRE-REQUISITES: CHE 202/221; CHE 312 or PSC 311

CHE 641 *Medicinal Chemistry II*. This course continues to explore the fundamental principles that define the relationship between the chemical structure and biological action of drug molecules. A major focus of the course is to study case histories of marketed and experimental drugs. An overview of the disease and the drug discovery approaches employed in drug discovery will be discussed. There will be special emphasis on drug design, metabolism, pharmacology, pharmacokinetics, and synthesis. (3) PRE-REQUISITES: CHE 415/CHE 640 or PSC 431/631 or PTP 401

CHE 650 *Bioanalytical Techniques*. The goal of this course is to understand the underlying principles, strengths, and limitations of state-of-the-art bioanalytical methods. The course is dedicated primarily to broadly biomedically relevant instrumental methods, such as spectroscopy, chromatography, electrophoresis, and mass spectrometry. Also emphasized are more specialized biochemical and biological techniques, such as protein determination, enzyme, ligand binding, and cell-based assays. (3)
PRE-REQUISITES:

CLINICAL LABORATORY SCIENCES (CLS)

CLS 650 (formerly CLS 520) *Clinical Hematology and Hemostasis*. This course will address the evaluation of blood cells and body fluids in the clinical hematology laboratory. The lecture and laboratory will highlight physiology, pathophysiology and laboratory testing of blood and bone marrow cells, evaluation of hemostasis and hemostatic disorders and the laboratory evaluation of formed elements found in other body fluids. (4)
PRE-REQUISITES:

CLS 655 (formerly CLS 525) *Urinalysis and Body Fluids*. This course includes the medical biochemistry of renal function and the interpretation of urinalysis and body fluid (spinal fluid, seminal fluid, and other body fluids) testing. Emphasis is on clinical significance and interpretation of laboratory results, specimen collection and preservation, biochemical test procedures, clinical microscopy and cytology of urine sediment. (2)
PRE-REQUISITES:

CLS 630 (formerly CLS 530) *Clinical Immunology*. The content of this course includes development of the immune system, immunoglobulin structure and genetics, antigen-antibody reactions, the major histocompatibility complex and antigen presentation, and immune responses to infections organisms and tumors. The lecture and laboratory will focus on diagnostic techniques employed in the identification of viral and bacterial diseases and the diagnosis of autoimmune diseases, allergies, immune deficiencies and AIDS. (4)
PRE-REQUISITES:

CLS 660 (formerly CLS 535) Immunohematology. Immunohematology is the laboratory application of immunologic principles to the identification of appropriate blood and blood products for transfusion and body tissues for transplant. The course will cover characteristics of red cell and white cell specific antigens, donor qualification and blood processing as well as the techniques for identification of auto- and allo-antibodies important to transfusion medicine and transfusion service specific regulations and quality control requirements. (4)

PRE-REQUISITES: CLS 630

CLS 640 (formerly CLS 540) Clinical Chemistry. This combined lecture/laboratory course focuses on basic concepts of laboratory instrumentation, troubleshooting techniques and the operation, evaluation and selection of instruments. Lectures emphasize chemical measurements of physiologic indicators of normal and abnormal human metabolism and address the elements of clinical chemistry and its application to diagnosis and treatment of patients. The significance of lipids, carbohydrates, proteins, enzymatic measurements, acid-base balance as they apply to diagnoses of cardiovascular, pulmonary, renal and metabolic diseases is emphasized through hands-on measurement and correlation with pathophysiology. (3)

PRE-REQUISITES:

CLS 610 (formerly CLS 550) Clinical Microbiology I. This course will focus on the study of aerobic bacteria. The diagnostic techniques involved in identifying the organisms, the significance of different organisms in various clinical specimens, the presentation of microbial disease states and the application of principles of infection control will be presented. The student will be familiarized with the methods used for transport, processing, identification and reporting of bacteria from specimens taken from the human body. Students will analyze and record laboratory data, comply with all safety procedures and learn to determine drug susceptibility, drug resistance and identify sources of infection. (4)

PRE-REQUISITES:

CLS 620 (formerly CLS 560) Clinical Microbiology II. This course follows similar principles as CLS550, but will focus on the study of medically relevant parasites and fungi. Students will also learn key aspects of mycological, and anaerobic infections. By participating in both classes CLS550 and CLS560 students will become proficient in traditional microbiology, as well as contemporary immune- and molecular-based identification technology. (4)

PRE-REQUISITES:

CLS 770, CLS 780 (formerly CLS 670; CLS 680) Clinical Practicum I and II. Students will participate in a number of experiential exercises in the affiliated hospital and laboratory sites. Rotations will include Clinical Microbiology, Clinical Chemistry, Immunohematology, Hematology and Coagulation, Immunology/Serology and Molecular Diagnostic testing. The clinical practicum experience will include specimen tracking, performance of routine analyses, demonstration of specialty testing, observation of automated instrumentation and management processes, including quality control and quality assurance activities. (9 credit per semester)

PRE-REQUISITES: Completion of all required CLS 600 level courses

CLS 760 (formerly CLS 690) Clinical Correlations. Students will evaluate a series of case studies which integrate all disciplines of laboratory diagnostic medicine. The cases will require knowledge of laboratory test result normal, factors that affect the accuracy of laboratory test results, quality management principles, and the ability to integrate diverse information to arrive at a diagnosis, corrective action or quality improvement recommendation. (2)

CO-REQUISITES: CLS 780

CYTOTECHNOLOGY (CYT)

CYT 610 (formerly CYT 510) Cytopathology of Female Genital Tract (FGT) Lecture and Laboratory. This course will present the basic principles of Cytopathology applied to the cellular samples obtained from the female reproductive system. Topics covered are the gross and microscopic anatomy, physiology and pathology of the cervix. This course will establish a foundation for identifying and understanding the basic epithelial cell types. Benign, reactive, and infectious conditions will be discussed. Infectious organisms and the cellular changes they produce will be identified. Pre-malignant and malignant conditions will be discussed and identified on cytologic specimens obtained primarily from the Pap Test. In the laboratory students will learn in an experiential setting by examining both pre-diagnosed and unknown cases from the FGT that demonstrate a wide variety of benign to malignant conditions. Infectious organisms and the cellular changes they produce will be identified. Cellular changes induced by therapies and environmental entities will be examined and criteria to identify these will be discussed. (4)

PRE-REQUISITES:

CYT 620 (formerly CYT 520) Exfoliative Non-Gynecologic Cytopathology I Lecture and Laboratory. This course will present the basic principles of cytopathology applied to the cellular samples obtained from a variety of body sites through brushings washings and scrapings. Gross and microscopic anatomy, physiology and pathology of these sites will be explored. Specimens from the Respiratory Tract and Gastro-intestinal Tract will be examined. This course will expand on the foundation for identifying and understanding the basic epithelial cell types begun in Introduction to Cytology and Cytology of the FGT. Benign, reactive and infectious conditions will be discussed. Infectious organisms and the cellular changes they produce will be identified. Atypical and malignant conditions and their cellular appearance on a variety of cytologic specimens will be explored. Cellular changes induced by therapies and environmental entities will be discussed and their role in rendering a final diagnosis will be recognized. In the laboratory students will learn in an experiential setting by examining both pre-diagnosed and unknown cases from these sites that demonstrate a wide variety of benign to malignant conditions. Infectious organisms and the cellular changes they produce will be identified. Cellular changes induced by therapies and environmental entities will be examined and criteria to identify these will be discussed. (2)

PRE-REQUISITES: CYT 610

CYT 630 (formerly CYT 530) Exfoliative Non-Gynecologic Cytopathology II Lecture and Laboratory. This course will present the basic principles of cytopathology applied to the cellular samples obtained from a variety of body sites through brushings washings and scrapings. Gross and microscopic anatomy, physiology and pathology of these sites will be explored. Specimens from the Genital Urinary System, Body Cavity Fluids and Cerebral Spinal Fluid will be examined. Benign, reactive and infectious conditions will be discussed. Infectious organisms and the cellular changes they produce will be identified. Atypical and malignant conditions and their cellular appearance on a variety of cytologic specimens will be explored. Cellular changes induced by therapies and environmental entities will be discussed and their role in rendering a final diagnosis will be recognized. In the laboratory students will learn in an experiential setting by examining both pre-diagnosed and unknown cases from these sites that demonstrate a wide variety of benign to malignant conditions. Infectious organisms and the cellular changes they produce will be identified. Cellular changes induced by therapies and environmental entities will be examined and criteria to identify these will be discussed. (2)

PRE-REQUISITES: CYT 620

CYT 640; CYT 650 (formerly CYT 540; CYT 550) Cytopreparatory Techniques I and II. These courses will develop the skills necessary to prepare a wide variety of specimens and teaches how to select and apply the appropriate staining technique for each. Students will learn to develop a Cytology Preparation Manual and how to comply with all State, OSHA and Federal regulations in a working laboratory. Emphasis will be placed on safe, efficient and effective handling techniques. Students will make a collection of representative slides from a variety of body sites using expired specimens donated from clinical affiliates. (1 each)

PRE-REQUISITES:

CYT 660 (formerly CYT 560) Fine Needle Aspiration Cytology I- Lecture and Laboratory. This course will present the basic principles of cytopathology applied to the cellular samples obtained through fine needle aspiration (FNA) from a variety of body sites where lesions can be identified by Radiological techniques. Gross and microscopic anatomy, physiology and pathology of these sites will be explored. Specimens from the Breast, Thyroid Glands, Salivary Glands and Lymph Nodes will be examined. Benign, reactive and infectious conditions will be discussed. Infectious organisms and the cellular changes they produce will be identified. Atypical and malignant conditions and their cellular appearance will be explored. Cellular changes induced by therapies and environmental entities will be discussed and their role in rendering a final diagnosis will be recognized. In the laboratory students will learn in an experiential setting by examining both pre-diagnosed and unknown cases from these sites that demonstrate a wide variety of benign to malignant conditions. Infectious organisms and the cellular changes they produce will be identified. Cellular changes induced by therapies and environmental entities will be examined and criteria to identify these will be discussed. (3)

PRE-REQUISITES: CYT 630

CYT 670 (formerly CYT 570) *Fine Needle Aspiration Cytology II- Lecture and Laboratory.* These courses present the basic principles of cytopathology applied to the cellular samples obtained through fine needle aspiration (FNA) from a variety of body sites where lesions can be identified by Radiological techniques. Gross and microscopic anatomy, physiology and pathology of these sites will be explored. Specimens from the Liver, Pancreas, Ovary, Kidney Adrenal Glands and Central Nervous System will be examined. The course will also include FNA of unusual lesions like: mediastinal lesions, bone and soft tissue lesions and pediatric tumors. Benign, reactive and infectious conditions will be discussed. Infectious organisms and the cellular changes they produce will be identified. Atypical and malignant conditions and their cellular appearance will be explored. Cellular changes induced by therapies and environmental entities will be discussed and their role in rendering a final diagnosis will be recognized. In the laboratory students will learn in an experiential setting by examining both pre-diagnosed and unknown cases from these sites that demonstrate a wide variety of benign to malignant conditions. Infectious organisms and the cellular changes they produce will be identified. Cellular changes induced by therapies and environmental entities will be examined and criteria to identify these will be discussed. (3)

PRE-REQUISITES: CYT 660

CYT 770 (formerly CYT 590) *Clinical Practicum I.* This course consists of two clinical rotations, the first one lasting seven weeks and the second for one week at two different clinical affiliate laboratories. Students rotate one week in a laboratory that deals with adjuvant methodologies such as molecular diagnostics, flow cytometry or proteomics. Students “shadow” a teaching cytotechnologist through their daily routine and participate in all laboratory activities as permitted. Students are expected to pre-screen cases that will later be re-screened by the teaching cytotechnologist, participate in preparation and staining of specimens, and any FNA, Tumor Board, Tissue Correlation and Patient Follow-up activities that their teaching cytotechnologist deems appropriate. (3)

PRE-REQUISITES: CYT 670

CYT 780 (formerly CYT 600) *Clinical Practicum II.* This course is a continuation of CYT 770 with two clinical rotations, scheduled as described for CYT 770. (6)

PRE-REQUISITES: CYT 770

ETHICS (ETH)

ETH 610 (formerly PSC 671) *Ethics in Research.* This course includes a discussion format based on ethical issues involved in the research process. Students will have focused reading on the ethical issues involved in research and then will apply the readings to case studies during discussion. Topics covered will include, but are not limited to: morality and research ethics, ethical issues before research committees, ethical issues involving human and animal subjects, reporting of research and conflict of interest. (1)

PRE-REQUISITES:

HEALTH OUTCOMES RESEARCH AND INFORMATICS (HRI)

HRI 610 (formerly PAD 725 Econometrics) Quantitative Regression Analysis. This course introduces students to multiple regression methods for analyzing data in economics and related disciplines. Extensions include regression with discrete random variables, instrumental variables regression, analysis of random experiments and quasi-experiments, and regression with time series data. Accordingly, the emphasis of the course is on empirical applications. (3).

PRE-REQUISITES:

HRI 615 (formerly PAD 615) Health Outcomes (Cross listed with PAD 515). This course will provide students with an introduction to the principles and techniques of pharmacoeconomics and health outcomes evaluation, and to the methodologies used by decisionmakers and stakeholders to draft and implement health policy. It builds on the economic principles presented in health economics (US and Global Health Care Systems) to describe the major components of the current U.S. healthcare system. Building on that foundation, the course introduces the techniques used for evaluation of health care interventions. These methods provide the basis for measuring and assessing the economic and non-economic consequences of healthcare interventions, emphasizing drug therapy, and pharmaceutical services. Examples of some of the economic methods introduced include: cost of illness analysis, cost-minimization, cost-effectiveness analysis, cost-benefit analysis, and decision analysis. Non-economic measures discussed include general and disease specific quality-of-life (QOL) assessments and health status measurement. Students will demonstrate the ability to critique published studies which use pharmacoeconomic or health outcomes techniques, assessing the quality of the research and drawing relevant conclusions. (3)

PRE-REQUISITES: PAD 415

HRI 625 (formerly PAD 675) Health Systems (Cross listed with PAD 451). This course presents a systematic comparative analysis of the evolution, administrative structure, finance, and provision of medical care in selected countries throughout the world. Equity/inequity and the current and looming effects of globalization will be explored. This course will expand your understanding of health and illness by looking at them as socio-cultural and socio-economic phenomena. Important differences rooted in culture, ethnicity, social, economic and political factors will be examined to encourage innovative "framing" of U.S. health public policies. This course presents and facilitates the development of an analysis of major health service delivery and management issues from an international perspective. Each country in the world possesses and implements a unique health service delivery system. While there may be many factors, components and issues in common, there are nonetheless many differences. It is important to learn about and analyze other country's healthcare systems, to learn how they treat similar issues and to discover innovations. Improvement often comes through change and innovations, and this study will not neglect the opportunity to learn from others, especially those middle and lower income countries implementing interesting and innovative reforms. By utilizing a comparable model of exploration, we will gain an understanding of the similarities and differences of industrial countries, third world countries and tribal programs in the US. (3)

PRE-REQUISITES:

HRI 635 (formerly PAD 636) Statistical Programming. This course teaches students how to use SAS, or other appropriate statistical software (i.e. R, Stata, etc.), for statistical programming. Since SAS is used extensively at universities, at Fortune 500 type businesses, in government, at research centers, and just about any other place where data are managed and analyzed, knowing how to use SAS is a useful skill for the job market. The class focuses on aspects of statistical programming with SAS. Students will learn the techniques of database management and data manipulation. Other SAS capabilities including the graphics package and the interactive data visualization package, PROC INSIGHT, will be discussed in addition to the basic techniques for one and two sample problems, analysis of variance, linear regression, and categorical data. (3).

PRE-REQUISITES:

HRI 645 (formerly PAD 693) Epidemiology I (Cross listed with PAD 393). This course covers the principles and methods of epidemiologic investigation including describing the patterns of illness in populations and research designs for investigating the etiology of disease. The course introduces quantitative measures to determine risk, association and procedures for standardization of rates. It also reviews application of basic principles and methods in the design and conduct of epidemiologic studies. Topics include the development of research questions; overview of epidemiologic study designs; sampling, sample size, and selection bias; techniques for data collection, sources of secondary data, and the evaluation of measurement and information bias; confounding and effect modification; techniques for simple and stratified analyses; and an introduction to mathematical modeling in epidemiology. (3)

PRE-REQUISITES:

HRI 646 (formerly PAD 694) Epidemiology II. Epidemiology is the study of the distribution and determinants of health-related states or events in specific populations and the application of this study to control health problems. These determinants are often seen in clinical practice and clinicians have a real opportunity to systematically evaluate various exposure-outcome relationships. The purpose of this course is to build on the foundations of epidemiology taught in Epidemiology 1. The emphasis of this course is application & variations on epidemiologic theory. The course is designed to develop critical thinking skills through the critique of journal articles, classroom discussion, lecture, and group exercises. Students will become aware of how to efficiently design and interpret epidemiologic studies. The course exposes students to common variants of traditional study designs and how these variations affect the validity & precision of exposure-response relationships. Epidemiology 2 has a greater emphasis on confounding, selection and information biases and techniques to minimize these biases using contemporary research methods. Logistic regression and other multivariate analyses are among these methods and this course reviews the basic concepts necessary to interpret these types of analyses

PRE-REQUISITES: HRI 645

HRI 655 (formerly PAD 610) Health Economics. This course is designed to introduce students to the economics of health care, with an emphasis on individual (i.e. demand side) decisions. We will examine how to apply microeconomic tools to analyze health care issues. Topics to be covered include demand for health and health care, individual responses to incentives inherent in health insurance markets, labor market effects, and health capital and health behavior decisions. Additionally, methodological issues for policy evaluation including cost-effectiveness and cost benefit analysis and estimating policy effects will be examined. Discussions will cover theoretical foundations as well as empirical methods and findings. (3)

PRE-REQUISITES:

HRI 665 (formerly PAD 741) Health Informatics. Health Informatics will introduce students to an interrelated set of theories, issues, technologies and methods related to the desire to improve healthcare through information technology. Different perspectives on the topic will be presented, with a particular emphasis on human factors and organizational learning. Students will gain practical experience in developing small health-related web applications. This will assist them in understanding the practical difficulties involved in improving systems through technology. In addition to a set of core health informatics topics, students will be given a set of optional topics from which they will choose one to research in depth. (3)

PRE-REQUISITES:

HRI 690 (formerly PAD 691) Topics in Public Health. (Cross listed with PAD 391) This course will provide students with a basic understanding of the public health component of the U.S. health care system. Students will be introduced to the historical development of public health (e.g., food and water safety, sanitation and disease monitoring). The current U.S. public health system – both at the state and federal levels – will then be discussed. Key measures of public health will be covered, with an emphasis on disease prevention and in areas where pharmacists contribute to public health goals (e.g., immunization programs).

PRE-REQUISITES:

HRI 710 Introduction to R Computing. This course is an introduction to the statistical computing environment R. In this course you will learn how to write programs in R in order to perform tasks that quantitative researchers must perform. You will learn the packages and functions that are used in statistical analysis as well as techniques for managing data and using graphs to visually describe data.

PRE-REQUISITES: MAT 610; PAD 725

HRI 720 Big Data Analytics. Big data refers to the idea that analysts manage, analyze, visualize, and extract useful information from large, diverse, distributed, and heterogeneous data sets to accelerate the progress of discovery, innovation, and information. Data are generated at such a great speed today that there is such large amounts of data that the challenge is how to develop efficient and effective computational tools to analyze the data to gain insight and make predictions; the interdisciplinary approach to machine learning, data mining, statistics, management, and analysis. This class will provide an overview of advanced machine learning, data mining, and statistical techniques that arise in data analytic applications (3)

PRE-REQUISITES: MAT 610; PAD 636, PAD 725

HRI 750 (formerly PAD 750) Capstone. The capstone project is an integrative activity with a variety of final products based on the degree program and type of project undertaken. It is an opportunity for a student to gain additional training in one or more areas of health outcomes and informatics. The scope of the projects will vary based on the industry placement or investigators involved and may include but not limited to the examination of the primary literature on the subject, organizing and modeling data, performing health outcomes and informatics analysis, and providing recommendations. The common elements for each project is the production of a high quality project (research project or exhaustive case studies), the requirement for oral presentation of the final project and review by the corporate and faculty supervisor. (3) PRE-REQUISITES:

HRI 751 (formerly PAD 751) Industry Practicum. The industry practicum is part of a capstone experience for students in ACPHS's master's degree program in Health Outcomes and Informatics. The practicum offers an educational opportunity for students to work for corporate clients doing real-time work, under the guidance of faculty, to analyze problems, negotiate requirements and scope, and solution development. The experience integrates all of a student's previous coursework. The capstone project is an integrative activity with a variety of final products based on the type of project undertaken. It is an opportunity for a student to gain additional training in one or more areas of health outcomes and informatics. (3) PRE-REQUISITES:

HRI 761 (formerly PAD 733) Thesis. Students will pursue a thesis project in a health outcomes research area selected to appropriately match their chosen career goals. In conjunction with the thesis advisor, students will perform an in-depth literature search and develop a testable hypothesis. The student and mentor then will work together to define a series of experiments that can be conducted to test the hypothesis. The student will learn the necessary techniques, conduct the experiments and analyze the data under the guidance of the mentor. Thesis work is compiled in a dissertation and presented as part of the thesis defense. (1-6) PRE-REQUISITES:

MATHEMATICS (MAT)

MAT 610 Statistical Inference and Modeling (cross listed with PSC 672). This course provides students with a basic knowledge of biostatistics. It includes methods of experimental design and data analysis used to make inference. Topics covered include confidence intervals, hypothesis testing, multivariable regression, generalized linear models, survival models and analysis of variance. The course will also include a component which introduces the students to statistical programming. (3) PRE-REQUISITES:

PHARMACEUTICAL SCIENCES (PSC)

PSC 631. *Foundations of Pharmaceutical Sciences.* The course reviews the foundational topics in Pharmacology, Pharmaceutics and Medicinal Chemistry, setting the stage for subsequent courses in the Pharmacology and Pharmaceutics tracks of the MSPS program. Topics covered include principles of receptor and ligand interactions, dose response curves, pharmacokinetics (absorption, distribution, and elimination of drugs), structure-activity relationships, pharmacodynamics (drug concentration and effect), biotransformation of drugs and factors affecting drug action, principles of computational modeling of receptor-drug interactions, and rational drug design. (3)

PRE-REQUISITES: CHE 312 or PSC 311; PSC 321/322

PSC 635 *Pharmacologic Regulation of Signal Transduction.* The course covers major drug classes, including antibiotics, anti-virals, anti-neoplastics, and drugs which act within the gastrointestinal tract. The mechanism of action, adverse effects, structure activity relationships, and pharmacokinetics of model compounds from each drug class will be considered. (2);

PRE-REQUISITES: PSC 431/631 or equivalent

PSC 636 *Neuronal Systems Pharmacology.* The course covers autonomic drugs, CNS drugs, including anesthetics, sedative hypnotics, antidepressants, antipsychotics, anti-seizure drugs, analgesics, and anti-Parkinson agents, and drugs used to treat endocrine disorders, including calcium disorders, hypothalamus, pituitary, and thyroid problems, anti-androgens, anti-estrogens and progestins, and drugs used to treat diabetes and hypoglycemia. The mechanism of action, adverse effects, structure activity relationships, and pharmacokinetics of each drug class will be considered. (3)

PRE-REQUISITES: PSC 635 or equivalent

PSC 645 *Drug Delivery Principles.* The course studies physicochemical and biological principles of drug delivery and pharmaceutical product design. These principles of physical pharmacy and biopharmaceutics are the foundations for drug candidate selection, pre-formulation, formulation design, and drug delivery systems. Targeted drug delivery and advanced systems for various routes of administration are also discussed by case studies. (3)

PRE-REQUISITES: PSC 341/342 or PSC 431/631 or equivalent

PSC 646 *Regulatory Science.* This course examines the process for bringing new drugs, medical devices and other medical products to the market from a regulatory point of view. It explores new directions in the science of developing methods and standards for assessing the safety, efficacy and quality of drugs, biologics, medical devices, cosmetics and other products, reviews the US federal regulatory system and discusses standards and operations of the Food and Drug Administration (FDA) including quality assurance, good laboratory practice, investigational new drug applications (NDA) and reviews process initiatives designed to speed drug review. Regulatory legislation, including the Food, Drug and Cosmetic Act is and global initiatives for international harmonization of worldwide pharmaceutical regulations are covered. (3)

PRE-REQUISITES: PSC341 or 645 or equivalent

PSC 651 *Pharmaceutical Sciences Journal Club*. This course, which is required for all Pharmaceutical Sciences graduate students, is designed to enhance the ability of graduate students to critically evaluate scientific articles published in juried scientific journals. Articles will be selected from current scientific literature in a variety of disciplines in the pharmaceutical sciences, including drug delivery, drug development, medicinal chemistry, molecular biology, pharmacogenomics, pharmacology, physiology, biochemistry and pharmaceuticals. All participants will read and critique the articles. Each student will present at least two articles per semester. (1)

PRE-REQUISITES:

PSC 661 *Research Rotation*. Students will complete a one semester laboratory rotation in order to facilitate the selection of a thesis research advisor. Students select a potential mentor based on interests and availability of openings in any given lab. Assignments, based on student preferences, will be made by the Pharmaceutical Sciences graduate program director. Students are expected to spend a minimum of 10 hours per week on laboratory research during the rotation. Students complete a rotation through a minimum of 1 lab and a maximum of 2 labs during the semester. They are to meet with the faculty advisor at least one hour per week for basic introduction to laboratory principles and practices, and to discuss their research. Students are required to complete reading assignments as directed by the faculty advisor and write a report of the research data and present a ten minute talk summarizing their research at the end of the rotation. (2)

PRE-REQUISITES: Permission of program director

PSC 672 *Experimental Design and Data Analysis*. (*cross-listed with MAT 610*) This course is required for all Pharmaceutical Sciences graduate students and provides students with a basic knowledge of experimental design and biostatistics. Students will learn how to design experiments and analyze the results. The course will cover single factor experiments, multiple factors, full factorial and fractional factorial designs and screening designs, the fundamentals of hypothesis testing and relevant biostatistics. (2)

PRE-REQUISITES:

PSC 732 *Cardiovascular Pharmacology*. This course is an elective for all Pharmaceutical Sciences graduate students (Pharmacology Track) and provides an in depth review of cardiovascular pathophysiology and pharmacology. The course reviews current concepts on the molecular mechanisms of cardiovascular function and the mechanism of action of drugs used to treat cardiovascular diseases. (2);

PRE-REQUISITES: PSC 635 or permission of instructor

PSC 733 *Pharmacology and Molecular Genetics of Cancer*. This is an elective course for all Pharmaceutical Sciences M.S. graduate students (Pharmacology Track) and includes a study of the molecular-genetic mechanisms underlying tumorigenesis, including the role of oncogenes, tumor suppressors, and pathogens (viruses and bacteria). Genomic approaches to the study of both hereditary cancers and somatic mutations will be explored. The pharmacology of current cancer therapeutics and the rational design of novel anti-cancer drugs will be discussed throughout the course. (3)

PRE-REQUISITES: PSC 631 or equivalent or permission of instructor

PSC 736 *Immunopharmacology*. This course explores the immune system from a pharmacological viewpoint. After a short review of the basic concepts of immunity, the course will closely examine the role of antibodies in immunodiagnosis, and immunotherapeutics. The immunotherapeutics portion of the course will examine the roles of vaccines and antibodies in modifying immune responses as well as drugs which modify immune responses in allergy and asthma, cancer therapies, immunosuppressives, biologics, immunotoxicology and dietary and plant immunomodulators. (3);

PRE-REQUISITES: PSC 635 or equivalent or permission of instructor.

PSC 737 *Immune-Brain Communication*. This course deals with the mechanisms by which the peripheral immune system and the brain exchange information to mount effective strategies to cope with systemic inflammation and sepsis. The course will closely examine the mechanisms by which immune signals generated in the periphery act upon the brain to produce host-defense responses such as fever, behavioral depression (sleep and anorexia), and hyperalgesia. The course will also examine how the brain, in turn, acts upon the immune system to modulate the intensity of the underlying inflammatory response. The interdisciplinary nature of this course will provide students with a critical understanding of the multifaceted connections between the immune system and the brain. (3)

PRE-REQUISITES: PSC 631, PSC 635 or equivalent or permission of the instructor

PSC 738 *Environmental Health: Toxicology, Regulation and Economics*. This course is designed to provide students with an introduction to and overview of the key areas of environmental health. Using the perspective of the population and community, the course will cover factors associated with the development of environmental health problems. Students will gain an understanding of the interaction of individuals, communities, and economic activity with the environment, the potential impact on health of environmental agents, and specific applications of concepts of environmental health. The course will cover principles derived from core environmental health. The sequence of major topics begins with background material and the tools of the trade (environmental epidemiology, environmental toxicology, environmental policy and regulation). The course then covers specific agents of environmental diseases (e.g., microbial agents, ionizing and non-ionizing radiation). Finally, applications and domains of environmental health are addressed (e.g., water and air quality, food safety, waste disposal, occupational health, and injuries). (3)

PRE-REQUISITES:

PSC 739 *Introduction to Psychoneuroimmunology*. This course examines the interaction between psychological processes and the nervous and immune systems. It integrates a substantial number of disciplines, including genetics, immunology, medicine, endocrinology, neuroscience, psychology and sociology. It is an integrative approach to both research and healthcare. The course will also cover the physiological functioning of the neuroimmune system in health and disease, disorders of the immune system, such as autoimmune diseases, hypersensitivities, and how psychological states, such as anxiety and depression, impact the neurological and immune systems and lead to the development or exacerbation of infections, heart disease, diabetes, and multiple sclerosis. (3)

PRE-REQUISITES: PSC 635 and PSC 672

PSC 741 *Pharmacokinetic Modeling.* The course presents concepts and mathematical techniques for description of the time course of drug disposition in biological systems. The course also presents biopharmaceutical and pharmacokinetic principles used in the selection, dosing, monitoring and evaluation of drug therapy. At the end of the course the student should be able to find, obtain, understand, analyze, evaluate, and synthesize pharmacokinetic information and make informed, rational, and responsible evaluation of drug dosage regimens. (3)

PRE-REQUISITES: PSC 645 or permission of instructor.

PSC 742 *Drug Discovery and Drug Development.* This is a translational and multi-disciplinary course that deals with all components of drug discovery and development from the bench to bedside and from concepts to molecules to medicines. This will include pharmacology, medicinal chemistry, molecular biology, biochemistry, immunology, formulation, delivery, pharmacodynamics, pharmacokinetics, pharmacogenomic, regulatory affairs, clinical research, clinical trials and evidence based medicine, marketing, business development, sales, medical affairs and patent filing. This course will be presented by the course coordinator who will be supported by experts from various pharmaceutical and biotechnology companies, and will include a number of case studies to illustrate the development of several blockbuster drugs. (3)

PRE-REQUISITES: PSC 631

PSC 743 *Pharmaceutical Stability.* This course studies the factors that influence drug stability, the mechanism of degradations, the methods to predict the stability, and strategies of stabilization. It also combines fundamentals and applied perspectives on the pharmaceutical stability assessment, which introduce the methods to analyze stability and determine shelf-life. An overview of the current industrial practices for stability testing is also provided. (3)

PRE-REQUISITES: Permission of the instructor.

PSC 744 *Special Topics in Pharmaceutics.* This is a mentor-student proposed course designed to allow students the opportunity to study diversified subjects of current interest which are not available in other courses. The subjects are related to physical pharmacy, biopharmaceutics, drug delivery, drug development and/or formulation design. The course is conducted through lectures, tutorial studies, library assignments and/or research projects in the selected areas of advanced study. The student, under faculty advisement, must propose a course plan to the department Graduate Curriculum Committee Chair for approval before registration. (1-3)

PRE-REQUISITES: PSC 645 or permission of instructor

PSC 750 (formerly PSC 861) *Capstone.* The capstone writing project is run as an independent study course. Students will select a topic in conjunction with the faculty instructor and prepare a written review of the existing scientific literature that is relevant to the chosen topic. The review should focus on a particular scientific problem that is actively being investigated and should define and discuss the scope of the problem, the alternative approaches that are being taken to address the problem, the substantive findings that have resulted from these approaches, and how these findings have shaped the current state of knowledge of the problem. (3)

PRE-REQUISITES: permission of instructor

PSC 756 *Chemical Biology*. Chemical biology is a diverse and evolving field involving chemical approaches to studying and manipulating biological processes. In this course, students will develop an understanding of chemical reactions utilized in the synthesis of small molecules and macromolecules, and of the chemical principles underlying enzyme functions and receptor pharmacology. The topics incorporated in this course are essential to understanding how drugs are currently developed in the pharmaceutical industry. (3)

PRE-REQUISITES: PSC 311/312 or equivalent

PSC 757 *Quantitative Drug Design*. The principles of subcellular pharmacokinetics are combined with the methods for estimation of drug-receptor binding energies for known and unknown receptors to provide a comprehensive quantitative approach to the construction of structure-activity relationships. The emphasis is placed on understanding the principles of quantitative descriptions of absorption, distribution, metabolism and excretion and drug-receptor binding in terms of drug structure and properties. The methods for prediction of the physicochemical properties of drugs, which are important in drug development, are analyzed in detail. (2)

PRE-REQUISITES:

PSC 758 *Molecular Modeling*. In this computer laboratory course, the students will gain hands-on experience with the molecular modeling software that is used in pharmaceutical industry. The following operations with protein structures will be learned: adding missing hydrogens to X-ray structures, assigning proper charges to amino acid residues, neutralizing the charges and preparing the structures for drug docking. The gained skills will include sketching molecular structures, docking them into macromolecular targets and performing simple binding energy predictions. (3)

PRE-REQUISITES:

PSC 759 *Drug Property Prediction*. In this computer laboratory course, the students will gain hands-on experience with the property prediction software that is used in pharmaceutical industry. The gained skills will include sketching molecular structures, with the emphasis on the charged substructures, and prediction of their ionization constants (pK_a values) and tautomer equilibrium constants. Computational estimates will be practiced for properties such as solubility and partitioning between two immiscible phases. (3)

PRE-REQUISITES:

PSC 760 *Macromolecular Structure*. This course will cover the fundamentals of macromolecular structure from the biochemistry of amino acids to protein motifs and folds, quaternary structure, post-translational modifications and protein-protein interactions. We will cover techniques available to gather information on protein structure (NMR, circular dichroism and X-ray crystallography) and methods used to investigate the interaction of proteins with other molecules (tryptophan fluorescence, isothermal titration calorimetry, NMR). This course will familiarize students with available proteomics tools including BLAST, Pymol, PDB and ExPASy and will provide students with the tools necessary to make connections between the structure and function, and deduce information about uncharacterized proteins. (2)

PRE-REQUISITES:

PSC 761 Thesis Research. This course consists of an independent research project which has been designed by the student, in consultation with the thesis advisor. The thesis advisor and thesis committee will be selected. The student will then develop a thesis proposal which will be approved by the thesis committee. Once the work described in the thesis proposal has been completed, the student will write and defend the thesis. It is anticipated that the thesis research will be completed over 2-3 semesters. (1-8)

PRE-REQUISITES:

PSC 771 Industrial Internship. Students will learn practical aspects of one or multiple fields of the pharmaceutical sciences in an industry setting. They will have opportunity to further develop technical skills while applying theoretical and course-learned background. Drug synthesis, study of mechanisms of action of drugs, formulation and pre-formulation, pharmacokinetics, quality control and regulatory affairs are examples of specific fields in which students may gain experience through this internship. (3-6);

PRE-REQUISITES: PSC 631 and permission of the advisor

PHARMACY ADMINISTRATION (PAD)

PAD 605 Quality Improvement in Health Care (cross-listed with PAD 505). The purpose of this course is to familiarize the student with the concept and the process of Quality Improvement across the Health Care System. Topics to be discussed in this course include the history of quality, leaders and trends in quality and patient safety, measurement and analysis of variation in different environments, and the guidelines for implementing quality management and the continuous quality improvement processes. Additionally, the students will apply knowledge gained by examining the changes that some US Health Care Systems have made and the impact that those changes have had on improving the quality of Health Care to Americans. (3).

PRE-REQUISITES:

APPENDIX D: Thesis Guidelines

THESIS AND ABSTRACT

Upon completion of the research project to the satisfaction of the student's research advisor and Thesis Committee, the student must submit a formal MS thesis and abstract based on the research. The thesis and abstract must be prepared in a style and format specified by the guidelines below. The document should be first critiqued by the research advisor and revised before being submitted to the members of the thesis committee. The thesis advisor is responsible for ensuring that the thesis meets the style and format requirements. If deemed necessary the Thesis Committee may decide if the student must make revisions in the document(s) and/or perform further work in order to satisfactorily complete the research project. The Thesis Committee will then pass their comments and suggested revisions back to the student, who will make the necessary revisions. The student's research advisor will examine the revised document to ensure that the student has made the necessary revisions. The Thesis Committee must certify by a minimum of two-thirds affirmative vote of its membership that the document is ready for the thesis defense. The thesis defense may not be scheduled until a complete version of the thesis is written. Students must be registered for at least one research credit during the semester in which the thesis is being evaluated.

PREPARATION OF THE THESIS

This document sets forth rules for the preparation of all master's theses. However, additional requirements may be imposed by the thesis advisor and committee, as long as these additions do not conflict with those of this document. The thesis advisor is responsible for ensuring that the thesis meets the format and style requirements outlined below.

Organization

Each thesis or dissertation contains a preliminary section followed by its main body and the references and appendices.

Preliminary Section

The preliminary section of the thesis contains the signed title page, abstract, list of figures, list of tables and a table of contents. This section should be numbered using lowercase Roman numerals (i, ii, iii, iv, ...)

Title Page

The title page includes the thesis title, author, date, submission phrase (*Submitted to the faculty of the Albany College of Pharmacy and Health Sciences in partial fulfillment of the Degree of Master of Science in...*) and printed names and signatures. The title should be concise, informative, and contain key words to facilitate indexing and searching. The date is provided in month and year format and is the date on which final approval of the thesis or dissertation is granted by the committee. The printed names and signatures are those of the advisor and committee members. Signatures must be done in blue or black ink ONLY. A sample title page appears below.

Abstract

The abstract may not exceed 350 words. Abstracts are constructed using complete sentences and paragraph structure, with no embedded headings, bullets or tables. The third person, past tense is used. An abstract is written after the thesis work is completed. The abstract begins by stating the main objective(s) and hypothesis of the thesis work in one or two sentences. The most significant methods used in the work are summarized. In most cases, two to three sentences should be sufficient for describing the methods. The main body of the abstract reports on the results and conclusions of the thesis work. The experimental findings are reported in the most concise and direct manner possible. The conclusion should be a concise analysis and interpretation of the results of the work. This section should make an impact on the reader so that it is clear what the outcome of the scientific work is and what it means.

List of abbreviations and symbols

All acronyms, symbols and abbreviations used in the thesis must be defined and listed.

List of figures

Figure numbers, figure title and page number where the figure is located must be included. Page numbers should be flush with the right margin.

List of tables

Table numbers, title and page number where the table is located must be included. Page numbers should be flush with the right margin.

Table of Contents

The main body of the thesis includes different sections (see) below. The table of contents should list the various sections of the thesis, with titles and identify the page number(s) where these sections appear in the thesis. Page numbers should be flush with the right margin.

Main Body

The body of the thesis must contain an introduction with a hypothesis and specific aims of the thesis project. The introduction is followed by a background and significance section, materials and methods, results and discussion, and conclusions. References and appendices follow the main body. When appropriate, care must be taken to secure from the copyright owners permission to reprint copyrighted material.

Introduction: Hypothesis and Specific Aims

The introduction must be a complete, but concise description of the thesis work, including a specific hypothesis and specific aims of the work. A summary of the experimental design used to achieve the specific aims should be included in the introduction.

Background and Significance

The thesis must contain a background section that summarizes relevant work that has been done in the area and its relationship to the project presented in the thesis. The background section should present work published in peer-reviewed journals relevant to the field of study and all reference to previously done work should be properly cited.

Materials and Methods

The materials and methods section includes a detailed description of all methods used in the experiments to complete the specific aims. Complete sentences (not bullets, not flowcharts, not abbreviations) must be used to describe the procedures that were done, although graphs, flowcharts or other diagrams may be used to supplement the text. Experimental descriptions should be in the format typically used in peer-reviewed journals in the field of study.

Results and Discussion

The results and discussion section of the thesis is the most important section. Results from each of the experiments described must be included. Results may be presented using tables, graphs or other diagrams but must be presented in text format as well. The results must be discussed in the context of the hypothesis and specific aims of the project and their relevance to previously published work in the area. Explicitly discuss whether the hypothesis is supported or not, and whether the specific aims were achieved, explicitly discussing how the results support this claim.

Conclusion

Provide an overall conclusion that summarizes the successes and/or failures of the thesis project. Identify what more needs to be done in the area or future directions the project may take.

In-text Citations, References and Appendices

All references cited in all sections of the thesis used must be included in this section. Only documented references may be used. Web pages may be cited but the URL and date referenced must be included in the citation. Students must use an approved citation style such as Vancouver, APA or MLA for all in-text citations and reference page style and it must be consistent throughout the thesis. When submitting the final thesis, the student will need to indicate the style and edition used for citations and references. This can be done through the “comments to administrator” section on the Proquest submission site.

Appendices may be used to provide additional documents or data that are important to material presented in the thesis but are supplementary to the main body of work. When such data are voluminous they are best presented as concisely as possible in one or more appendices. Appendices must be titled and are usually designated using uppercase letters (A, B, C). Appendices must be listed in the table of contents.

THESIS FORMAT

Printing and Binding

Type sizes of 10 - 12 characters per inch or point are acceptable. The same type size and font style must be used throughout the entire document to insure uniformity of appearance. Only one side of each page may be used for printing. Students must purchase a minimum of three bound copies of the thesis (one for the ACPHS library, one for the advisor and one for the SGS). Students may purchase as many additional, personal copies as they choose. All costs associated with printing and binding are the responsibility of the student.

Students must submit the final, approved thesis in pdf format to the Proquest online system (www.etsadmin.com/acphs) for final review by the Office of Graduate Studies and binding. OGS will review the submitted thesis to be sure it meets all formatting guidelines and will notify the student if any corrections need to be made. Students will also be notified once the thesis has been cleared by OGS. Once cleared, the thesis will be approved for binding. Proquest will send the three college copies directly to ACPHS. Any additional, personal copies ordered by the student will be sent to the address provided by the student. Binding and shipping takes approximately 8 – 12 weeks so students must provide an address that will be viable 2 – 3 months out.

Spacing

The text of a thesis must be double spaced throughout with the exception of footnotes, references, and extended quotations, which are single spaced. Paragraphs should be delineated by an indentation.

Margins

All margins must be one inch except the left, which must be 1.5 inches to allow for binding.

Pagination

There is no page minimum or limit to the MS thesis, however a typical MS thesis may be anywhere from 30 -100 pages long. Every page of a thesis is assigned a number, although a number may not appear on every page. The position of the page number must be consistent from page to page. Preliminary pages must be numbered consecutively using small Roman numerals (i, ii, iii, iv etc..). The remainder of the thesis or dissertation should have Arabic numerals (1, 2, 3, 4, etc..).

Tables and Figures

The term "table" is used to designate a portion of the thesis containing a columnar or other systematic arrangement of numbers, words, or symbols. The term "figure" refers to representations by graphs, charts, drawings, or photographs. Except in highly unusual circumstances, the word table or figure are used as descriptors rather than graph, picture, etc. Each table and figure must be numbered and have a legend with a maximum length of 40 words. The titles and legends of tables and figures should be concise and descriptive of the information presented in that table or figure. Tables and

figures are constructed either horizontally or vertically, but must fit within the required margins. Tables and figures are inserted in the text throughout the thesis and should be referred to and placed near the text that is relevant. Tables and figures larger than the standard page size must be reduced by some reproduction method to fit within the required margins. All tables and figures must be of high quality and resolution and be fully legible.

Numbering

Tables are numbered sequentially with numbers appearing at the top of the table, preceding the title and separated from it by a period. Figures are numbered sequentially, with the number placed below the figure preceding the caption and separated from it by a period. Structural chemical formulas are sequentially numbered, with the number centered under the formula. Chemical or mathematical equations are sequentially numbered, with the number enclosed in parentheses and placed at the right margin.

Coloring

Black and white figures are preferred. Colored figures must be of sufficient contrast such that information conveyed by different colors can be distinguished in black and white copies.

Abbreviations

Whenever possible abbreviations should conform to practice within a discipline. Lists of acceptable abbreviations are frequently included in journal Instructions to Authors information. Theses and dissertations should routinely use SI units and abbreviations, unless there is a compelling reason to prefer an alternative system of units. All unusual and unconventional abbreviations must be defined when first encountered in the thesis or dissertation and also included in the list of abbreviations and symbols in the preliminary pages (*vide supra*). The abbreviation "et al" may be used in the text to indicate the work of three or more authors. It is not permitted in the reference list.

Sample Thesis Title Page

Preparation of 2(- Aminotaxol Through the β -Lactam Synthon Method

by Hengqun Shen

Submitted to the faculty of the Albany College of Pharmacy and Health Sciences
in partial fulfillment of the Degree of Master of Science in Pharmaceutical Sciences

June 2011

Approved by:

Printed Name
Thesis Advisor

Signature

Date

Printed Name
Committee Member

Signature

Date

Printed Name
Committee Member

Signature

Date

Printed Name
Committee Member

Signature

Date

APPENDIX E: Contact Information

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