

# School of Graduate and Postdoctoral Studies

2015-2016 Academic Catalog



Rosalind Franklin University of Medicine and Science and the School of Graduate and Postdoctoral Studies reserve the right to change, at any time and without notice, their requirements, regulations, course and program offerings, fees, charges, and other matters addressed in this catalog. RFUMS must reserve the right to modify or terminate programs described herein. However, modification of program requirements will not adversely affect those students already enrolled in a program, nor will termination of a program affect anything other than the closure of admission thereto.

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June, 2015

Dear Prospective Student,

*The School of Graduate and Postdoctoral Studies at Rosalind Franklin University has a proud tradition of training outstanding research scientists for successful careers in the biomedical sciences. In doing so, we continually strive to contribute to the current fields of research and knowledge. Toward those ends, we in the Graduate School have developed numerous opportunities for you to fulfill your academic goals. Our programs provide multiple and varied research experiences followed by in-depth research endeavors that will prepare you for your future career. It is an exciting time at Rosalind Franklin University. Over the past few years, we have grown significantly with new basic science investigators throughout each department in addition to the development of new programs and schools. Our Graduate School is one of five schools at Rosalind Franklin University, all of which are devoted to the biomedical and health professions. The emphasis on interprofessional education at Rosalind Franklin University provides a truly unique, broad-based, interactive academic climate contributing to our careers in biomedical sciences. This approach, coupled with the intensive, directed research of individual investigators and their research teams within the Graduate School, generates tremendous opportunities for innovative, interdisciplinary research. As such the Graduate School is both a focal point and source of innovation, discovery, and progress. The students, staff, and faculty within our Graduate School enrich this research environment. As a student within the Graduate School, you will find outstanding investigators and educators who are committed to the advancement of science and to your success in research, education, and training. I hope you will be inspired to join us in our pursuit of knowledge and long legacy of discovery.*

Sincerely,



Joseph X. DiMario, PhD  
Dean, School of Graduate and Postdoctoral Studies

## **SGPS MISSION**

To provide outstanding graduate education and postdoctoral training to meet the need for highly qualified researchers and educators in the life science and health care fields, and to advance knowledge through biomedical research

## **SGPS VISION**

To excel in all facets of the training of graduate students and postdoctoral fellows, and thereby gain national recognition for preparing outstanding biomedical scientists and educators whose contributions will advance knowledge in the life sciences

## **SGPS VALUES**

Diversity • Excellence • Innovation • Integrity • Mentorship • Scholarship • Scientific Curiosity

## **HISTORY**

For over 100 years Rosalind Franklin University of Medicine and Science has been educating physicians and furthering biomedical research. Beginning in 1912 the Chicago Medical School was created as a medical school and hospital where employed men and women could study medicine at night. Under the direction of John J. Sheinin, MD, PhD, DSc, who served as Dean and President from 1932 to 1966, CMS successfully met the challenges arising from the restructuring of American medical education.

In 1967, the University of Health Sciences was established. It was comprised of the Chicago Medical School, the School of Graduate and Postdoctoral Studies, and the School of Related Health Sciences later renamed the College of Health Professions. In 1970 baccalaureate programs were offered in Physical Therapy and Medical Technology. Since that time, the College of Health Professions has expanded to include masters- or doctoral-level programs in the following areas: Biomedical Sciences, Clinical Psychology, Health Administration, Health Professions Education, Interprofessional Healthcare Studies, Nurse Anesthesia, Nutrition, Pathologists' Assistant, Physician Assistant, and Physical Therapy.

In 1980, the University relocated to its current campus in North Chicago, Illinois adjacent to the Captain James A. Lovell Federal Health Center and Naval Station Great Lakes. That same year, the University was granted full accreditation by the North Central Association of Colleges and Schools. The University was one of the first educational institutions in the country devoted to educating men and women for a broad range of professional careers in health care and research.

In 2001, The Dr. William M. Scholl College of Podiatric Medicine, founded in 1912, became part of the University. In 2002, in order to accommodate its growth, the University opened the Health Sciences Building. This state-of-the-art, 140,000 square-foot facility houses the Feet First Museum, laboratories, auditoriums, classrooms, and departmental offices. The University became a residential campus for the first time in its history when three student housing facilities opened in 2003.

On January 27, 2004, the University publicly announced its intent to change its name to Rosalind Franklin University of Medicine and Science, in honor of Rosalind Franklin, PhD, a pioneer in the field of DNA research. The name change became legal on March 1, 2004, at which time the School of Related Health Sciences also changed its name to College of Health Professions. In addition to the name change and the announcement of several new strategic initiatives, the University has been in the midst of profound physical growth.

A University-wide interprofessional committee was established in 2004 and charged with developing the “Interprofessional Model of Care” for the University as well as model educational experiences. The concept for the Interprofessional Healthcare Experience began as an outcome of the University’s strategic plan, which emphasized the importance of interprofessional collaborations. As a requirement for graduation, Rosalind Franklin University of Medicine and Science now requires all first year clinical students to complete the Foundations for Interprofessional Practice course in order to foster interprofessional collaborations between all programs.

The University’s Basic Sciences Building is a 400,000-square-foot facility that houses a 52,000-square-foot Library and The Daniel Solomon, MD, and Mary Ann Solomon Learning Resource Center as well as administrative offices, classrooms, auditoriums, basic science departments, research and teaching laboratories, and dining areas. In 2006 the University opened a two-story, \$10 million research expansion to the Basic Science Building to further its mission of scientific discovery.

In 2010, the University broke ground on the 23,000-square-foot Morningstar Interprofessional Education Center which offers additional classrooms, laboratories, clinical simulation spaces, and an amphitheater. It is the home of the College of Pharmacy, which welcomed its inaugural freshman class in fall 2011.

In 2013, the Rothstein Warden Centennial Learning Center was completed. This 73,000-square-foot, three-level addition to the University’s campus facility features state-of-the-art learning spaces that foster collaboration and enhance interaction between students and faculty. These rooms and their configurations further the University’s commitment to interprofessional education.

In 2014, the DeWitt C. Baldwin Institute for Interprofessional Education was added as well as the Student Welcome Center. Aligned with the University’s central Mission and Vision, the DeWitt C. Baldwin Institute for Interprofessional Education is dedicated to advancing interprofessional education and practices in medical and health professions.

Dr. Rosalind Franklin, through her pioneering work in the science of life and through her unflagging perseverance, serves as a role model for our faculty and students, and represents the future of biomedical science and integrated health care. Her history mirrors our own in many profound ways, marked by dedication to discovery even in the midst of difficult times. Upon that history, her legacy guides the future of the University itself. To learn more about Dr. Rosalind Franklin and the University’s dedication to her legacy, visit [www.rosalindfranklin.edu/RosalindFranklin](http://www.rosalindfranklin.edu/RosalindFranklin).

After more than 100 years of excellence in healthcare education, Rosalind Franklin University of Medicine and Science has only just begun to write its history. We hope you will join us in creating bold visions for an ambitious future.

## **EQUAL OPPORTUNITY**

It is the policy of Rosalind Franklin University of Medicine and Science not to discriminate based on race, sex, sexual orientation, color, creed, religion, national origin, disability, or age in admissions or employment or in any programs or activities. It is the University's intent to comply with applicable statutes and regulations, including Title IX of the 1972 Education Amendments and Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) of 1990. All prohibit discrimination against individuals with disabilities by mandating a provision of reasonable accommodations to make programs and activities accessible to qualified disabled individuals. There are natural and legal limitations to what services can be provided. It is the University's goal to assist students in developing their potential in light of what is feasible and reasonable under the law. Inquiries may be directed to the Associate Vice President of Student Affairs and Enrollment Management at 3333 Green Bay Road, North Chicago, IL 60064-3095; 847-578-3204

## **ACCREDITATION**

Rosalind Franklin University of Medicine and Science receives its degree-granting authority from the Illinois Board of Higher Education and is accredited by the Higher Learning Commission.

Higher Learning Commission  
230 South LaSalle Street, Suite 7-500  
Chicago, IL 60604  
800.621.7440



## **LOCATION**

The School of Graduate and Postdoctoral Studies (SGPS) is located on the campus of Rosalind Franklin University of Medicine and Science, at 3333 Green Bay Road, North Chicago, IL 60064. The University is situated in the northern suburbs of Chicago, with easy access to downtown Chicago and the surrounding areas by car or public transportation.

## CLASSIFICATION OF STUDENTS

Applicants are admitted to the School of Graduate and Postdoctoral Studies in one of five categories: Regular Graduate Student, Combined Degree Student (MD/PhD or DPM/PhD), Faculty Doctoral Student, Student-at-Large, or Conditional Acceptance.

### REGULAR GRADUATE STUDENT

This student intends to seek an MS or PhD degree, and pursues no other academic goal until all degree requirements are completed. A Regular Student is one who has been judged by the School of Graduate and Postdoctoral Studies to meet the admissions requirements and is qualified to pursue the graduate degree. The graduate student is expected to maintain or exceed the SGPS performance requirements, as well as the specific requirements of the department for the duration of his/her graduate education.

Regular Students admitted to the Graduate School in pursuit of a doctoral degree enter the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS). This program takes the students through one year of core studies relevant to the various degree offering programs in the School of Graduate and Postdoctoral Studies. The first year also includes rotations into different laboratories, allowing the student to experience the type of research that is done in each laboratory before making a laboratory selection. By the end of the first year, the IGPBS student selects a mentor/advisor in whose laboratory their doctoral thesis will be researched.

Regular students are considered full-time, unless otherwise designated by the Dean. Students must be enrolled for a minimum of 1 credit each quarter to maintain full time status. Student and mentor work together to determine the appropriate quarterly demands to ensure steady progress toward the degree.

### COMBINED DEGREE GRADUATE STUDENT

The Combined Degree program is designed for individuals who are strongly motivated to have a career in both academic medicine and research. These students pursue combined degrees and have been judged by the admission committees of both the Graduate School and their respective clinical program to have met all admission requirements.

- **MD/PHD** Application may be made simultaneously to both schools or after the completion of the first year of medical education at the Chicago Medical School. Upon enrollment in the Combined MD/PhD Program, the student is considered to be concurrently studying in both CMS and SGPS through completion of their PhD and clinical degrees.
- **DPM/PHD** Application may be made only after completion of the first year of podiatric medical education at Dr. William M. Scholl College of Podiatric Medicine. Accepted students are notified in April of their 2<sup>nd</sup> year and begin studies after completion of their P2 requirements. Upon enrollment in the Combined DPM/PhD Program, the student is considered to be concurrently studying in both SCPM and SGPS through completion of their PhD and clinical degrees.

After studying for two years in the clinical program at RFUMS, MD/PhD and DPM/PhD students pursue their PhD through a funded program before finishing their third- and fourth-year clinical rotations. In the PhD phase of the program, students are mentored by experienced primary investigators and train in cutting-edge laboratories. The PhD phase of the program must be completed before the student can return to their MD or DPM studies.

### FACULTY DOCTORAL PROGRAM

This program is designed for individuals who are full-time, salaried faculty members at RFUMS and who are qualified to pursue a PhD in biomedical sciences, while maintaining a faculty appointment within their home department. The graduate student in this program is expected to maintain all SGPS performance

requirements, as well as any additional requirements of the Faculty Doctoral Program and the research department for the duration of their graduate education. Prospective Faculty Doctoral candidates are encouraged to contact the SGPS Dean's Office, phone 847/578-8493. The application process requires a pre-admission lab rotation.

**STUDENT-AT-LARGE**

The Student-at-Large intends to satisfy an intermediate academic or career goal by completing specific graduate school courses. This limited goal must be achievable in no more than three consecutive academic quarters and by itself does not result in a degree. This explicit goal, and both academic and performance requirements are stated and mutually agreed upon as a condition for admission as a Student-at-Large. A students in good standing in an external institution or within another RFUMS school may become an SGPS Student-at-Large. This status may not circumvent the SGPS application deadlines, materials, standard academic qualifications or IGPBS first year curriculum.

**CONDITIONAL ACCEPTANCE**

Candidates may, on rare occasion, be accepted conditionally for degree-seeking programs of study within the School of Graduate and Postdoctoral Studies. Conditions for acceptance will be provided in writing and agreed upon before matriculation. Academic performance and other on-going measures of the student's ability to succeed in the Graduate School are required.

## ADMISSION

*This section describes only the procedures and minimum requirements for admission to the School of Graduate and Postdoctoral Studies. It should be noted that, for the Faculty Doctoral Program and in the instances of transfer students, some departments may have additional specific requirements for admission. Candidates are considered for admission without regard for disabilities, as required under the Americans with Disabilities Act and related legislation. However, the Graduate School has determined a series of abilities and skills that are required of all students. These SGPS Technical Standards are detailed in the SGPS Student Handbook.*

### APPLICATION PROCEDURES

Information about completing an application is available from:

Office of Admissions

Rosalind Franklin University of Medicine and Science

3333 Green Bay Road North Chicago, Illinois 60064 Telephone: 847-578-3204

Application forms are available at: <http://www.rosalindfranklin.edu/sgps/home.aspx>

The following materials are required to complete an application to the degree programs in the School of Graduate and Postdoctoral Studies:

1. Completed application form and transcripts from all post-secondary institutions previously attended. SGPS reserves the right to request that international credentials be evaluated for U.S. equivalency.
2. Current scores for the general test of the Graduate Record Examination (GRE) are required for all applicants to the PhD and MS programs. Combined Degree applicants submit MCAT scores for their clinical program and are encouraged to submit GRE scores as additional application support. Neither score is required of applicants to the Faculty Doctoral Degree.
3. Three letters of recommendation from persons involved in the applicant's previous educational or work experience, whichever was more extensive and recent. One of these three letters must be from the candidate's primary research mentor, if applicable.
4. A personal interview is required. When an on-campus interview is not possible, the requirement may be satisfied by a telephone, remote, or videoconference interview. The interview cannot be waived for Students-at-Large or Combined Degree applicants.
5. Proficiency in both written and verbal English language skills is required. A valid Test of English as a Foreign Language (TOEFL) is required of any international applicant who does not hold US citizenship or permanent residency. This test must have been taken within the last two years, and scores must be sent directly from the testing service ([www.toefl.org](http://www.toefl.org)). This requirement may be waived, at the University's discretion, for applicants who have been full-time students in an United States college or university for at least two consecutive years or those from countries in which English is the primary language. The School of Graduate and Postdoctoral Studies does not accept the International English Language Testing System (IELTS) for the purpose of assessing language proficiency.
6. A financial statement for international students, with supporting documentation, is required of all foreign applicants, if offered an acceptance for graduate study. (Not required for Faculty Doctoral Program).
7. Applicants to the Faculty Doctoral Program must submit:
  - A completed application form.
  - A letter from the Chair and/or Dean of the Department in which the candidate holds a primary appointment. This letter must indicate their support for pursuit of the PhD degree completion by providing the candidate with the time, relief of duties, alternate schedule, etc. (within reason).
  - Three letters of recommendation from applicant's own school/department faculty, at rank of assistant professor or higher, previous research supervisors or equivalent.
  - A professional CV.

- Outline of previous research experience, including a chronological list of all publications or abstracts on which the candidate's name appears (title, date and all contributing author information is required).
- A one-page personal essay describing the candidate's motivation, career goal, and reasons for pursuing graduate studies at RFUMS. *Include the anticipated enhancement to the department in which the faculty member holds his/her appointment that would result from the candidate's pursuit of this degree.*
- Well-delineated research question / hypothesis the candidate plans to pursue during the course of study.

Rosalind Franklin University does not and will not provide any commission, bonus, or other incentive payment based directly or indirectly on success in securing enrollment or financial aid to any persons or entities engaged in any student recruiting or admissions activities or in making decisions regarding the award of student financial assistance.

## **TRANSFER APPLICATIONS**

Students wishing to transfer from another graduate program into the School of Graduate and Postdoctoral Studies may apply for a transfer with advanced standing. However, all aspects of the student's academic accomplishments will be reviewed to determine whether the candidate fulfills the requirements of the School of Graduate and Postdoctoral Studies. These applications are evaluated by the Graduate Admissions Committee on a case-by-case basis.

## **HOW DECISIONS ARE MADE CONCERNING AN APPLICATION**

Once an application for admission as a regular student is complete, the Admissions Office forwards it to the Graduate School Admissions Committee for evaluation and possible interview. After thorough evaluation and interview the Committee submits its recommendations to the Dean for further action.

Those applications that are found acceptable by the Committee for Transfer or for the Faculty Doctoral Program are forwarded to the appropriate department for evaluation, since individual departments may have additional requirements for admission. The department reviews the application and makes its own recommendation to the Dean for further action.

## **Notice of acceptance or rejection of a candidate is issued only from the Office of the SGPS Dean.**

Combined Degree acceptances must also be reviewed and approved by the respective CMS or SCPM Dean.

A candidate for non-degree seeking Student-at-Large status must request permission from their department of interest to apply using a customized Student-at-Large application form. The department will develop a statement of objectives for the course work the student seeks to complete and set performance standards that the student will be expected to meet, which must accompany the Student-at-Large application form. This form is submitted to the Admissions Office and is routed directly to the SGPS Dean's Office upon completion. If approved by the Dean, the departmental standards and objectives constitute the conditions under which a student is admitted as a "Student-at-Large."

Applications from degree-seeking students may be recommended by the Graduate School Admissions Committee to receive a "Conditional Acceptance" with specific material or academic parameters, if the student's level of academic achievement is not consistent with minimum SGPS criteria. If approved for conditional acceptance by the SGPS Dean, the parameters set for these students as a condition of acceptance will be used to evaluate their candidacy for regular student status after a predetermined number of academic quarters has been completed.

## **SECURING INFORMATION CONCERNING THE STATUS OF AN INDIVIDUAL APPLICATION**

The Admissions Office provides applicants with information about the status of incomplete applications. In addition, the Office periodically notifies the applicants concerning items missing from their applications.

Once an application is complete, it is forwarded to the Graduate Admissions Committee. Although the time required for review of each application varies, applicants are notified by the SGPS Dean's Office of admission decisions as soon as possible.

The School of Graduate and Postdoctoral Studies recognizes that it handles, distributes, and transmits personal and confidential information about student applicants, enrolled students and other trainees to administrative offices in departments at RFUMS. This information is covered under the Family Educational Rights and Privacy Act (FERPA) of 1974, as amended. The School of Graduate and Postdoctoral Studies recognizes that maintenance of confidentiality is important to applicants and current trainees.

All faculty and staff affiliated with the School of Graduate and Postdoctoral Studies who handle, transport, and/or evaluate student applicant and current trainee files are required to maintain the confidentiality and security of all files. Current students within programs of the Graduate School may not possess or be responsible for the security of applicant files. The Graduate School strongly discourages the practice of duplication of application material. Information regarding individual applicants or current trainees will not be shared with individuals outside the review process without expressly written permission by the applicant or trainee. No personally identifying information of any kind about an applicant or current trainee will be given over the phone, regardless of permission. Aggregate information regarding applications and current trainees, de-identified of any personal and private information, may be collected and provided to state, federal, and accrediting agencies.

## **MINIMUM REQUIREMENTS FOR ADMISSION TO THE SCHOOL OF GRADUATE AND POSTDOCTORAL STUDIES**

To be considered for admission as a School of Graduate and Postdoctoral Studies student, the applicant:

1. Must have a bachelor's degree or its equivalent from a regionally accredited college or university.
2. Will be selected on the basis of:
  - Previous academic work
  - Adequate preparation in the field of proposed graduate study (as determined by the graduate faculty in that field)
  - Grade point average
  - Satisfactory scores on required examinations
  - Recommendations from persons involved in the student's previous educational, research and work experience
  - A personal interview. When an on-campus interview is not feasible (students in foreign countries), remote, telephone or videoconference interviews are employed.
  - Any such other considerations that the applicable University and departmental admissions committees deem appropriate

## **WHAT THE GRADUATE ADMISSIONS COMMITTEE LOOKS FOR IN A SUCCESSFUL APPLICANT**

In general, the Graduate School's Admissions Committee considers criteria it deems appropriate in recommending applicants for admission. It looks for, among other criteria, the following demonstrated or potential characteristics in applicants it recommends for admission:

1. Evidence that the applicant can meet the scholastic requirements of the Graduate School on the basis of past academic performances.
2. A high level of academic learning, especially a strong aptitude for abstract thought and conceptualization.
3. Capacity for conducting well-organized, independent scientific investigations.
4. Ability to cope successfully with the academic, research and/or clinical performance required in a graduate school curriculum.
5. Motivation to make a lifetime commitment to academic study, scientific research, health administration, and/or clinical service.
6. Commitment to the highest standards of ethical and professional behavior.

### **MINIMUM REQUIREMENTS FOR ADMISSION AS STUDENT-AT-LARGE**

To be considered for admission as a Student-at-Large, the applicant should:

1. Hold at least a bachelor's degree or its equivalent from a regionally accredited college or university. A transcript from the institution where the applicant received the bachelor's degree is required.
2. Clearly state the objective he/she seeks to achieve by successfully completing the proposed course work.
3. International applicants must demonstrate language ability by providing TOEFL results, as detailed above.

### **WHAT THE GRADUATE SCHOOL LOOKS FOR IN A SUCCESSFUL STUDENT-AT-LARGE**

In general, the Dean, the appropriate departmental chairs, and the Graduate Admissions Committee consider criteria they deem important in deciding whether to admit an applicant as a student-at-large. Among the criteria they look for are the following:

1. Evidence that the desired educational objective can realistically be achieved.
2. Evidence that the academic performance criteria chosen by the applicant realistically reflect the educational objective. (Ex: If the objective of the educational experience is to secure a graduate school admission, the academic performance criterion should be at least a "B" average for a full academic load.)
3. A maximum of three academic terms in the student-at-large student status is permitted.
4. For students assigned to a department, their status must be reviewed at the end of each academic quarter by the Department Chair and appropriate recommendation made to the Dean. This recommendation may include one of the following:
  - That the student continues pursuit of the academic objective(s) and his/her enrollment be continued.
  - That the student's academic objective has been met, and his/her enrollment terminated.
  - That the student's academic objective has not been met, and his/her enrollment terminated.

### **MINIMUM REQUIREMENTS FOR THE FACULTY DOCTORAL PROGRAM**

Prior to acceptance in the program, the applicant must demonstrate evidence of the following:

1. An earned masters degree or entry level professional degree from an accredited university or college, with a GPA  $\geq 3.0$
2. Evidence of an academic and/or scholarly background in current basic science or clinical research.
3. Current faculty appointment in RFUMS.
4. School dean and department chair written endorsement/support of degree pursuit and plan of study.
5. Three letters of recommendation from applicant's own school/department faculty, at rank of assistant professor or higher, previous research supervisors or equivalent.
6. A developed, feasible research question congruent with RFUMS resources.
7. An identified mentor who will intellectually and financially support the applicant's doctoral work.
8. Completion of a preliminary laboratory rotation with selected mentor.

### **WHAT THE GRADUATE ADMISSIONS COMMITTEE LOOKS FOR IN A SUCCESSFUL FACULTY DOCTORAL APPLICANT**

*Successful applicants to the Faculty Doctoral Program:*

1. Hold a current academic appointment within the University, which they will maintain while pursuing a terminal degree.
2. Have an established track record of maturity, diplomacy and successful time management skills within their appointment.
3. Enter the program with a well defined research agenda including procurement of an appropriate mentor.
4. Display significant drive and independence, as well as responsibility for their own learning process.
5. Will follow the established matriculation process established by IGPBS, but each plan of study, including course work and research will be individually established.
6. Pre-Application Lab Rotation Assessment – Each candidate for the program must complete a lab rotation with the prospective mentor, for a minimum of 3 months (can be part time). The mentor must complete an assessment of the rotation using the pre-formatted form available on the SGPS Resources webpage.

### **MINIMUM REQUIREMENT FOR COMBINED DEGREE APPLICANT**

To be accepted as a combined degree student, the applicant must be accepted into both the clinical program (Chicago Medical School or Dr. William. M. Scholl College of Podiatric Medicine) **and** the School of Graduate and Postdoctoral Studies. Application to the Combined MD/PhD Degree Program may be made simultaneously to both schools via the AMCAS Combined Degree application and Graduate School evaluation process. Alternately, application to the School of Graduate and Postdoctoral Studies can be initiated after completion of the first year of professional study at Chicago Medical School or Dr. William M. Scholl College of Podiatric Medicine (see Internal Students section below).

### **ENTRY-LEVEL MD/PHD STUDENTS**

The application process begins with an application to the Chicago Medical School through AMCAS ([www.amcas.org](http://www.amcas.org)). Students designate their application to the Chicago Medical School as “Combined Medical/PhD” when applying. Candidates must submit all required documents for completion of the Chicago Medical School file (supplementary application, letters of recommendation and application fee, etc.) and abide by the standard CMS application deadlines. Accepted MD/PhD candidates are admitted jointly to both the Chicago Medical School and the School of Graduate and Postdoctoral Studies.

### **INTERNAL STUDENTS (MD/PHD OR DPM/PHD)**

Current RFUMS students beginning their M2 year at the Chicago Medical School or P2 year at Dr. William M. Scholl College of Podiatric Medicine are also eligible to apply for the Combined Degree program, with what is known as a “Track II application”. These are highly motivated students who have found a calling to become physician scientists. These students must have maintained a 3.5 GPA while enrolled at RFUMS and have laboratory experience with a willing and approved research mentor in the basic sciences. Track II students, if admitted, enter the Graduate phase of the program after completion of their M2 or P2 year and completion of their respective Step I exam (USMLE or APMLE), and begin working immediately with a research mentor towards their PhD.

Prospective Track II students should submit an application to the Admissions Office. The following items must be submitted in support of the application.

- Completed Track II Application Form
- RFUMS Student File and Transcript Release
- Two letters of recommendation from professors who can evaluate the candidate’s research activities and research potential. One of these letters must be from the proposed RFUMS research mentor, the second may be from another RFUMS, undergraduate, or external research advisor.
- Physician Scientist and Research Background Essays.

*Accepted Track II candidates must submit mentor agreement documentation, but they may not continue in the lab before passing their USMLE Step I or APMLE Part I exam. Only upon completion of the PhD may any Combined Degree Student re-enter the clinical phase (M3 or P3) of their respective professional program.*

### **CONDITIONAL ACCEPTANCE**

In some cases, a conditional acceptance may be offered for one of the SGPS degree-seeking programs. Acceptance conditions could include items such as verification of materials, successful completion of external coursework or exams, or post-acceptance SGPS program performance. In all cases, the conditions and timeline for meeting any conditions will be clearly articulated in the program’s acceptance letter.

### **TRANSFERRING COURSE CREDIT FROM ANOTHER SCHOOL**

The SGPS Dean and the department chair, where appropriate, may consider transferring course credits from

another RFUMS school or external institution to fulfill SGPS degree requirements. Normally, such determination is made individually, based on available information concerning the transfer course work. All transfer credits must be approved by the SGPS Dean.

**FOR ADDITIONAL INFORMATION**

Because the University recognizes that interested persons need more information than this catalog can provide, prospective applicants and their advisors are encouraged to contact the respective Program Director or the School of Graduate and Postdoctoral Studies Dean. Visit us on the Web at [www.rosalindfranklin.edu/sgps/home.aspx](http://www.rosalindfranklin.edu/sgps/home.aspx). In addition, the SGPS Student Handbook orients entering students, details the school's daily routine, and can be found online at the above hyperlink for all interested parties.

**NON-IMMIGRANT INTERNATIONAL STUDENTS**

The School of Graduate and Postdoctoral Studies is authorized under federal law to enroll non-immigrant international full-time students. Part-time students requiring visa support cannot be considered at this time. For questions regarding immigration matters, please contact the Director of Diversity and Inclusion Programs at Rosalind Franklin University of Medicine and Science, 3333 Green Bay Road, North Chicago, IL 60064 USA. Phone: 847.578.8745

## DEGREE REQUIREMENTS

### DOCTOR OF PHILOSOPHY

The PhD is awarded in recognition of excellence in research and scholarship relating to a specific field. The candidate must demonstrate ability in a field by passing Doctoral Candidacy Examinations in both general and specialty areas and by preparing and defending a doctoral dissertation. This dissertation must demonstrate the student's ability to master the literature, to do independent research, and to make an original contribution to the chosen field.

Students in the Regular Degree Program will enroll in the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS) first year core, specialty and elective curriculum for their first year of studies and then take the advanced graduate courses of the department (program) of the advisor they have selected for their doctoral studies.

Students in the doctoral program may be awarded an MS under certain circumstances. These include: 1) the MS is an integrated sub-section of the overall doctoral project. (In this case, the MS is simply one of the integrated chapters of the final dissertation (thesis) document); or 2) it is awarded as a terminal MS degree because of failure on the part of the student to successfully complete the PhD degree using established matriculation markers (Doctoral Candidacy Exams, research phase, etc.). The MS degree will be based on a body of original research at the limited scope of an MS degree.

All students in the Regular Degree Program leading to a PhD will take their Doctoral Candidacy Exam at the beginning of the third year after admittance to the program (between August and November of the third year). MD/PhD and DPM/PhD students complete their Doctoral Candidacy Exam as quickly as possible within one year of entering their mentor's laboratory, taking into consideration any required advanced courses and preparation of preliminary data for the grant proposal that is a part of the Exam.

All doctoral students will select a primary advisor (mentor) within the first year of studies. MD/PhD and DPM/PhD students select their mentor prior to entering their PhD phase. Once this selection is made, the mentor and student, with the approval of the Department Graduate Oversight Committee and the Dean of the Graduate School, will select a "Research Committee" for the student. This Research Committee is composed of the mentor and four additional members, one of which must be from outside the department and can be from outside the University. Students in the Combined Degree Program must select two additional Committee members to ensure availability during the defense phase and timely re-entry to the clinical program. The Chair of the Research Committee is someone other than the mentor.

The Research Committee will provide scientific support and oversight of the student's doctoral research program, and will also serve as the examining committee that evaluates the student at the Doctoral Candidacy Exam and Doctoral Defense. During the summer following completion of the IGPBS core curriculum, the mentor and student will develop the student's doctoral research project. Based on this research project, the mentor and student will select faculty members that best complement this research project to serve on the Research Committee. The Research Committee, along with the mentor and Department Graduate Oversight Committee Chair establish and document the student's advanced course requirement and any additional programmatic requirements for the degree. Student progress toward the degree is reported by the mentor to the Department Graduate Oversight Committee every six months for review, and those reports are forwarded to the SGPS Dean's Office.

### RECOMMENDATION TO CANDIDACY (PHD) – THE CANDIDACY EXAMINATION

The assessment purpose of the Doctoral Candidacy Exam, otherwise known as the Preliminary or Comprehensive Exam, is two-fold. First, the intent of the exam is to assess the current status of the student with regard to the student's knowledge base in biomedical sciences and the student's current abilities to

conduct research, including the abilities to formulate hypotheses, design careful experiments, interpret data, generate accurate conclusions, and effectively communicate the research project both orally and in writing. Secondly, the purpose of the exam is to assess the student's potential to successfully complete the requirements for the doctoral degree. Considerations in this assessment include, but are not limited to, the student's potential to complete a significant body of research, the student's potential to effectively defend the doctoral thesis, and the potential for the student to have a successful career in the biomedical sciences.

It must be emphasized that the Doctoral Candidacy Exam has several additional and important purposes. The Doctoral Candidacy Exam provides a unique opportunity for professional development. The exam provides an opportunity for the student to generate a cohesive, thoughtful, and significant research plan. The ability to do so is critical to the professional development of the student during doctoral training as well as in the student's future career. The student's obligation is to take this opportunity to develop, to the best of the student's ability, the research plan and its presentation in a professional manner, meeting the Research Committee's expectations of standards of knowledge, research abilities, and career potential. It is the responsibility of the Research Committee to ensure that all aspects of the Research Candidacy Exam are conducted professionally and in both the immediate and future interests of the student. It is also the responsibility of the Research Committee to provide an outstanding example of professionalism in its interaction with the student as well as in its assessments of the student's academic abilities and potential for success in a biomedical career. The Research Committee has the obligation to use the Doctoral Candidacy Exam as an opportunity not only for student assessment, but for education, council, and professional development of the student. The Chair of the Research Committee is responsible for communicating to the Dean of the School of Graduate and Postdoctoral Studies matters of perceived breach of professionalism from anyone involved or participating in the Doctoral Candidacy Exam.

The student will formulate a research project and write a grant proposal. The proposal will be formatted by the current standards of an NIH R01 application. Please consult [www.nih.gov](http://www.nih.gov) for current format requirements of the R01 application. The topic of the research proposal may be directed in one of two manners.

- A. The research project of the proposal can be based directly on the student's research. The student may use preliminary data generated for the doctoral thesis. It is important to note that the student's research plan should be independently generated by the student, with consultation, advice, and guidance from the mentor. The written research proposal must be the product of the student. The intent of this approach is to facilitate generation and submission of an NRSA proposal for the student's own future research support.
- B. In consultation with the mentor and approval by the Research Committee, a student may propose a research project that is *closely aligned* with the student's own doctoral research plan but is *not identical* to that plan. The intent of this approach is to provide a student with the experience and ability to formulate new, independent hypotheses and generate new lines of research investigation with supporting background, significance, rationale, and justification. Emphasis is placed on the mentor and Research Committee to ensure that the proposed research topic is appropriate to the immediate and long-term training and goals of the student.

Regardless of the approach taken, the student will prepare an overall research proposal with specific aims. This is analogous to the Specific Aims section of the R01 application. The document will be presented to the Research Committee for approval and suggestions for improvement. The mentor and Research Committee should be actively involved in the development of the student's research proposal by providing appropriate mentorship for professional development.

The second part of the Doctoral Candidacy Exam is the oral examination. This portion of the exam is based on the written research proposal and core and advanced courses taken by the student in their graduate education.

Upon the recommendation of the Research Committee to the Dean of the School of Graduate and Postdoctoral Studies, and with approval of the Dean, the student will advance to the status of "Candidate for Doctoral Degree". The Research Committee may recommend deferral of advancement to candidacy. If this is the recommendation, the Research Committee must provide, in writing, the reasons for deferral and the explicit means to remediate the deficiencies. Copies of this letter must be forwarded to the student, the student's mentor, the Department Chair, the Department Graduate Oversight Committee, and the Dean of the Graduate School. If the initial oral examination was not satisfactorily completed, the second oral exam must be completed within 4 months of the first oral exam. The date of the second exam must be communicated to the Dean. Upon completion of the second oral exam (if necessary), the Research Committee must complete and submit the "Report of Doctoral Candidacy Examination" form to the Dean. Upon the recommendation of the Research Committee to the Dean of the School of Graduate and Postdoctoral Studies, and with approval of the Dean, the student will advance to the status of "Candidate for Doctoral Degree". If the student fails the second oral exam, the student may be given the option to earn a Master Degree. This terminal degree must be research-based.

To fulfill the research requirements for a Master's Degree by a student who has not advanced to doctoral candidacy, the student must submit a manuscript to a peer-reviewed journal. The student's research may comprise the entire manuscript or be a significant contribution to a broader study submitted for publication. Evidence of submission of the manuscript with the student's authorship or co-authorship must be provided to the Dean. (See Also "Master of Science Degree")

#### **DEFENSE OF THE DISSERTATION**

The student and mentor, with concurrence of the Research Committee, will determine the date for defense of the dissertation. The defense is presented to the Research Committee both in a public presentation and in an exclusive meeting of the student with the Research Committee. The format of the thesis must conform to the acceptable thesis format described in the Thesis Manual, obtainable via the SGPS website or Dean's Office.

Although it is strongly encouraged and expected, publication of the student's research in peer-reviewed journals is not a prerequisite for successful defense of the dissertation. Individual departments and mentors have the discretion to set minimum requirements for publication. Such requirements must be clearly expressed to the student before entry into a laboratory for doctoral research.

The student must submit the thesis in electronic format to the UMI/Proquest Dissertation Publishing website, including any corrections of the thesis required by the Research Committee and approved by the Research Committee, within 30 days of the dissertation defense to the Dean's Office. Bound copies of the final dissertation are not required by the Graduate School.

#### **PHD CURRICULUM**

Course requirements are established, maintained, and monitored by individual departments and the School of Graduate and Postdoctoral Studies. As such, students must fulfill both department and Graduate School course requirements. The student, mentor, Department Chair, Department Graduate Oversight Committee, and Research Committee are responsible for ensuring that course requirements for each student are satisfactorily completed. Each department may have graduate course requirements in addition to the Graduate School required courses listed below.

In compliance with NIH Responsible Conduct of Research instruction requirements, all SGPS students are required to complete the course GIGP-508 Ethics and Regulatory Issues in Biomedical Research in their first and fifth years of training.

Regular Graduate Students within the IGPBS Program are required to take the following courses:

- GIGP-500 First Year Research Rotations – Core Course
- GMTD-709 Molecular and Cellular Sciences Seminar – Core Course
- GIGP-501 Molecular Cell Biology I – Core Course
- GIGP-502 Molecular Cell Biology II – Core Course
- GIGP-503 Systems Lectures – Core Course
- GIGP-507 Art of Scientific Presentation – Specialty Course
- GIGP-508 Ethics and Regulatory Issues in Biomedical Research – Specialty Course
- GIGP-509 Biostatistics – Specialty Course
- GIGP-510 Computer Applications in Biomedical Sciences – Specialty Course

And one or more of the following Electives:

- GIGP-505 Cellular and Molecular Developmental Biology – Elective Course
- GIGP-506 Systems Physiology – Elective Course
- GIGP-512 Neuroscience – Elective Course\*

\*Students selecting the Neuroscience elective must also take the Physiology elective

A timeline of doctoral degree progression is provided below, including IGPBS required and elective courses.

Doctoral Degree Training Progression Schematic

	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	
	Fall Term			Winter Term			Spring Term			Summer Term			
<b>G1 - IGPBS</b>	GIGP-501 (MCB I) GIGP-507 (Art of Sci Present) GIGP-510 (Computers)			GIGP-502 (MCB II) GIGP-503 (Systems) GIGP-508 (Ethics)			GIGP-509 Biostatistics Electives: One or more of 3: -GIGP-512 Neuroscience -GIGP-506 Physiology -GIGP-505 Dev. Biology			Work in mentor's lab			
	Molecular and Cellular Sciences Seminar Series												
	Department Interaction Sessions	Lab Rotation #1		Lab Rotation #2		Lab Rotation #3		Lab Rotation #4		Lab Placement by June 1			
<b>G2 - Pre-Candidacy Studies</b>	Advanced Coursework			Advanced Coursework			Advanced Coursework			Advanced Coursework			
	Research begins. Student Research Committee formed & first meeting held no later than by December 1 <sup>st</sup> .						Define and refine research problem with mentor. Begin preparing NIH-R01 grant-style proposal due by Fall Term of G3 year.						
<b>G3 - Post-Candidacy Studies</b>	By Fall Term: Part A. Turn in Proposal Part B. Candidacy Exam			Research Towards Thesis						6-Month Progress Meeting		Research Toward Thesis	
	Advanced Coursework			Advanced Coursework			Advanced Coursework			Advanced Coursework			
<b>G4-Gx</b>	Research Toward Thesis			6-Month Progress Presentation		Research Towards Thesis			6-Month Progress Meeting		Research Toward Thesis		
	Successful Thesis Defense presentation and Examination by Committee <u>must be completed prior to May 15<sup>th</sup></u> . Publication of the Thesis is required for degree to be issued. Degrees can be issued at the time they are earned, but the formal Commencement ceremony is held annually in June.									Commencement			

Questions? Contact the SGPS Dean's Office 847.578.8493

Due to the extensive coursework of Combined Degree Students and experience of Faculty Doctoral Students, the Research Committee will determine the complete course requirements for the PhD phase of their training.

The requirements may or may not include the required courses of the department. Nevertheless, Combined Degree and Faculty Doctoral Students are required to take the following courses:

GIGP-507 Art of Scientific Presentation  
GIGP-510 Computer Applications in Biomedical Sciences  
GIGP-508 Ethics and Regulatory Issues in Biomedical Research  
GIGP-509 Biostatistics

To waive a course requirement of the Graduate School, a completed "Student Petition" form to waive the required course must be completed and submitted to the Dean of the Graduate School. The petition must be supported by official transcripts from an accredited college or university indicating successful completion of an equivalent course. The petition must also be approved by the mentor, program director, and Department Chair. Meeting these requirements for petition of a waiver of a course requirement does not guarantee that the waiver will be granted by the Dean.

## **MASTER OF SCIENCE DEGREE**

MS student applicants apply through the Office of Admissions (Graduate Admissions). The student's academic records must meet the minimal standards of the Graduate School (BA/BS degree; 3.00 GPA, etc.), although appeals to the Dean can be made on a case-by-case basis.

The mentor is determined at the time of acceptance and the mentor must have a MS thesis research project identified for the student (the student knows what this project is prior to acceptance). A Research Committee (mentor and 2 to 3 additional members – those who can provide research input on the student's research project) is formed at the time the student has identified a mentor prior to acceptance. Within one month of acceptance, the student (under the guidance of the mentor) presents the MS research thesis proposal to the Research Committee. At that meeting, the Research Committee determines, with the mentor and student, what coursework (if any) is needed by the student.

Coursework is custom designed for each student. There is great flexibility in this determination based on the educational background of the student. Some students may need the entire first year of the IGPBS, a course or two from the first year, or courses only from the Advanced Courses of the department. In some cases, because of the strong background of the student, only special reading course(s) with a faculty member on the area of research may be required. In addition to any courses required by the department, all Masters Degree students will be required to take the specialty courses of the IGPBS, unless they have previously completed such a course from an accredited university and it can be documented on official transcripts, or they obtain special waiver approval from the Dean of the Graduate School because of training they previously received through work experience (a request for waiver must be submitted to the Dean by the Mentor). These courses include:

GIGP-507 Art of Scientific Presentation  
GIGP-510 Computer Applications in Biomedical Sciences  
GIGP-508 Ethics and Regulatory Issues in Biomedical Research  
GIGP-509 Biostatistics

As well as all required certification components such as radiation safety, IRB, IACUC, etc.

To fulfill the research requirements for a Master's degree, the student must submit a manuscript to a peer-reviewed journal. The student's research may comprise the entire manuscript or be a significant contribution to a broader study submitted for publication. Evidence of submission of the manuscript with the student's authorship or co-authorship must be provided to the Dean.

Students enrolled in the other colleges (Chicago Medical School, Dr. William M. Scholl College of Podiatric Medicine, College of Health Professions or College of Pharmacy) at RFUMS can apply for entrance to the MS program.

## ACADEMIC PERFORMANCE STANDARDS AND MEASUREMENT

### GRADING

A pass/fail grading system customarily is used for seminar and research courses. All other course work is graded as follows:

A = High Achievement

B = Above Average Achievement

C = Average Achievement

F = Fail

P = Pass

I = Incomplete. Evidence required for a qualitative grade has not yet been submitted, but arrangements have been made.

**Note:** The privilege of completing all work required to change a grade of I (Incomplete) cannot be extended beyond the end of the quarter following the quarter this grade is received. On or before this date, a final grade must be entered.

W = Withdrawal

PP = Pass Proficiency Exam

# = Graded at Sequence End

IP = In Progress

NC = No Credit Given

AU = Audit

### COURSE CREDIT

Academic work at RFUMS is measured by “units of credit.” In conjunction with the letter grade a student receives from the course instructor, units of credit give a fairly accurate evaluation of the amount of time that has been devoted to a given subject. Doctoral and Master degree students in SGPS do not have a minimum number of hours required for a quarter to be considered full time.

The number of credit hours assigned to a course must be proportional to “student workload,” entailing lecture, laboratory work, clinical/internship work, and other out-of-class work associated with a course. It is neither practical nor desirable to precisely measure these quantities in an ongoing fashion. Therefore, the RFUMS policy provides a set of general guidelines for the assignment of credit hours to courses in the curriculum.

All classes offered for credit at RFUMS are equated a standard credit hour. One credit hour is equivalent to one hour (50 minutes) of lecture per week or two hours per week for laboratory, clinical experience, or small group discussion. Courses may last for one or more quarters. Grades are reported at the end of each course. Details of the curriculum for each program and the specifics of each course are described in the catalogs of each of the five schools and colleges.

The Registrar's Office is responsible for the final determination of credit hours for a course. RFUMS uses the quarter system to measure the length of a term. The quarter system is generally 12 weeks of classes including final examinations.

### ACADEMIC RECORDS

A copy of each student's complete academic record at the University is furnished upon request to him/her after each academic quarter attended – a written request form is available on the Registrar's Website. Students are encouraged to periodically monitor their academic progress via WebAdvisor.

### ACADEMIC CALENDAR

All schools within Rosalind Franklin University operate under a quarter calendar, and credit is expressed in quarter hours.

**HOLIDAYS, VACATION TIME AND BREAKS**

The nature of research is on-going. SGPS students are required to follow the University Holiday Calendar. This is true for all degree seeking doctoral students (combined, regular and IGPBS).

New Year's Eve (½ Day)	Labor Day
New Year's Day	Columbus Day
Martin Luther King, Jr., Day	Thanksgiving Day
President's Day	Day After Thanksgiving Day
Memorial Day	½ Day Christmas Eve
Independence Day	Christmas Day

These days are noted in the University's Human Resource Website, and also in the SGPS Student Handbook.

IGPBS Students – Because enrollment from Fall through Summer quarters is required for completion of the IGPBS Program Core Phase, new students in IGPBS are allowed only the holidays as determined by the University for the first four terms. This schedule is NOT the same as the Student Academic Calendar. There is no vacation time scheduled through the end of Summer Quarter without the IGPBS Program Director's approval.

All non-IGPBS Students – A two week vacation period may be arranged only with the approval of the student's mentor and Department Chair. Vacation beyond two weeks requires approval of the Dean and may affect stipend support.

Although students follow the University academic calendar for coursework, graduate students do not have intersession breaks between quarters due to research requirements.

All graduate students are required to adhere to rules set forth by their departments for reporting sick time, vacation usage, etc. (See also Leave-of-Absence)

**MAINTAINING ACADEMIC STANDARDS**

Any student enrolled in the School of Graduate and Postdoctoral Studies is expected to remain in Good Standing by maintenance of a cumulative 3.0 grade point average (4.0 scale). No grades below a B are considered acceptable. If a student receives a grade below a B, an automatic progress assessment is initiated by the IGPBS Director or Department Graduate Oversight Committee (DGOC). This evaluation of status and performance may produce recommendations which can include, among others, remediation of deficiencies, discontinuation of stipend support and/or tuition waiver, expulsion from the program, and implementation of the funding payback policy.

In addition, individual departments may require the student to maintain a specific quality point level in the major subject area to maintain Good Standing. If a student fails to maintain Good Standing based on department standards, the Department Chair will notify the student of this status and provide a recommendation to the DGOC, mentor or IGPBS Director, and Dean.

Student progress toward fulfillment of degree requirements is evaluated at the end of each academic quarter by either the Department Graduate Oversight Committee or the IGPBS Director for first year regular doctoral students. Any student who fails to satisfactorily meet any of the required standards in any given quarter will be notified by the DGOC or IGPBS Director that an assessment of progress toward the degree will be made with recommendations for course of action. Required standards for satisfactory degree progress include, but may not be limited to:

- Maintenance of Good Standing in graduate course work
- Satisfactory performance in laboratory rotations and thesis research

Recommendations from the DGOC or IGPBS Director regarding lack of satisfactory performance are forwarded to the Dean for approval. If a student's degree progress falls below either Graduate School or departmental standards for two consecutive or three non-consecutive quarters, the following steps will be taken:

1. The Department Chair or IGPBS Program Director will notify the Dean of the student's status and of the recommendation.
2. The Dean may refer the question of the student's future status to the Department Graduate Oversight Committee, requesting its recommendation.
3. The student will have the right and opportunity to present evidence and to discuss his/her situation with the Department Chair, IGPBS Program Director, DGOC, and Dean before recommendations and decisions are made.
4. The Dean will determine, based on these recommendations and discussions, whether the student will be dismissed or continue as a student on academic probation. The decision will be provided to the student in writing.

Six month evaluations are also conducted for students who have advanced to doctoral candidacy. Required standards for satisfactory degree progress include, but may not be limited to:

- Maintenance of Good Standing in graduate course work
- Satisfactory performance in laboratory rotations and thesis research

If a student's degree progress falls below either Graduate School or departmental standards the following steps will be taken:

1. The Research Committee will notify the student's mentor and Department Graduate Oversight Committee of the student's status and of its recommendation.
2. The DGOC, Department Chair, and mentor will evaluate the student's degree progress and provide recommendations to the Dean.
3. The student will have the right and opportunity to present evidence and to discuss his/her situation with the Department Chair, DGOC, mentor, and Dean before recommendations and decisions are made.
4. Based on these recommendations and discussions, the Dean will determine whether the student will continue on academic probation or be dismissed. The decision will be provided to the student in writing.

### **RETAKING COURSES**

The Graduate School discourages the retaking of courses or examinations to improve grades. Courses or exams may be retaken only after approval of a petition to the Dean, endorsed by the course director, program director and chair of the student's department. Such petition is a document detailing the student's concern and stating their request. It is preferred to be type-written, including the names of those endorsing the document.

### **WITHDRAWAL FROM A COURSE**

With written approval from the instructor and the Dean, a student may withdraw from a course by petitioning the Dean at any time within six weeks after registration. The student's grade is recorded as W (withdrawn).

### **NON-ACADEMIC PERFORMANCE STANDARDS**

Students in the School of Graduate and Postdoctoral Studies are subject to dismissal for unethical and/or unprofessional behavior in their student role.

## **STATEMENT OF POLICY ON PROFESSIONALISM AND ETHICS**

All students at Rosalind Franklin University are expected to exhibit professional, responsible and ethical behavior. Students should display this behavior as students in the University, as health care providers in the clinical setting and as researchers in the laboratory or clinic. All students should, therefore, possess the highest degree of personal integrity and be able to reason about ethical issues in their professional life. Students are expected to treat patients and research subjects with respect, compassion and sincerity, irrespective of race, color, creed, ethnic origin, religion, disability, gender, sexual orientation, or socioeconomic class, and to maintain strict confidentiality. Students are expected to be honest and trustworthy, to respect the property of others, and to follow the code of professional ethics appropriate to their discipline. Any departures from these standards may result in disciplinary action.

## **PROCEDURES FOR CONSIDERATION OF VIOLATIONS OF ETHICAL AND PROFESSIONAL STANDARDS**

A student under suspicion of ethical or professional misconduct shall be afforded appropriate notice and an expedient process in the investigation, deliberation, and decision about such allegations and potential penalties. The student shall also be afforded the right to appeal any negative outcomes to the Dean of the School in which the student is enrolled. Refer to the School of Graduate and Postdoctoral Studies Handbook for procedures described to ensure such rights for the student and the University.

## **STUDENT TREATMENT**

Students have a right to work and study in an environment free from harassment; as such, the University will not tolerate student mistreatment. A primary goal of RFUMS is the education of students who will meet the health care needs of society in a caring, competent, and professional manner. Insensitivity during training/education runs counter to the fundamental tenets of health care and impairs the ability of many students to maintain their idealism, caring, and compassion past training into their careers. Refer to the RFUMS Student Handbook for the Student Mistreatment Statement.

## **STUDENT RECORDS**

All documents and records pertaining to a student's admission and academic performance in the University are filed in the Office of the Registrar. Refer to the RFUMS Student Handbook for information regarding Students' Personal and Academic Information.

## **STUDENT PETITIONS**

Students may petition the Dean to waive or deviate from the stated requirements or for any other academic matter requiring resolution by the Dean. Petitions must be submitted by the student to the Dean's Office on the appropriate form for the respective change. A memo explaining the request may be attached. The mentor should be copied.

## **LEAVE-OF-ABSENCE** (*see also Registrar's Policy*)

Regular students in the School of Graduate and Postdoctoral Studies are expected to maintain continuity and diligence in pursuing a specified advanced degree. A leave-of-absence is a temporary interruption of academic progress, granted for up to one year at a time during which the student is not registered for courses, possibly resulting in a delay in advancement of fulfilling requirements for the degree and which does not compromise academic objectives determined by the academic program. When a student must be absent from academic work at the University, for any reason, departmental approval must be obtained. For periods longer than three weeks, the student shall petition the Dean for a leave-of-absence and receive approval before leaving.

Full-time, regular and combined-degree graduate students who receive stipends are eligible for Family Medical Leave of Absence (FMLA) according to University policies and procedures. Graduate students in all programs are eligible for leave of absence other than FMLA. All leaves of absence are subject to the procedures set forth in the SGPS Policies and Procedures book.

Unauthorized leave may be considered as withdrawal from graduate school. Graduate students may be allowed a leave-of-absence for a period of up to one year by the Dean, upon the recommendation of the chair of the department (or Committee). Registration after an absence of more than one year shall require resubmission of a new application for admission. Time spent on an approved leave-of-absence will not be included within the maximum period in which a degree program must be completed.

**PERMANENT WITHDRAWAL FROM THE SCHOOL OF GRADUATE AND POSTDOCTORAL STUDIES**

If a student permanently withdraws from graduate school (does not seek and receive a leave-of-absence), proper documentation must be supplied (see Registrar’s Leave of Absence and Withdrawal Policy). Tuition for the current term may be refundable at the University’s discretion. Contact Student Financial Services for details.

**TUITION AND EDUCATIONAL EXPENSES, 2015-2016**

Graduate School (per year)	\$27,000
Student Services Fee	\$90
Student Council Fee	\$40
Technology Fee	\$200
Books and Supplies (Estimate)	\$900 - \$1,000

**CREDIT HOURS**

The number of hours credited for any course in the School of Graduate and Postdoctoral Studies is determined by the individual department. Such determination is based on the time a student is expected to spend preparing for and participating in a particular course. Full Time Status is not dependent on the number of quarterly registered credit hours, but on enrollment as a Regular Graduate Student. Faculty Doctoral, Student-at-Large, Concurrent Master’s, and Conditional Acceptance students are considered part time.

**TUITION FOR PART TIME STUDENTS**

Tuition for students who, for whatever reason, are taking a part-time academic load is assessed per credit hour (e.g., Student-at-Large, Faculty Doctoral Students, and Students in a concurrent master’s program).

**TUITION FOR STUDENT-AT-LARGE**

The University reserves the right to assess Students-at-Large at a higher tuition rate per credit hour than is assessed Regular Graduate Students.

**TUITION AND AUDITING A COURSE**

In general, students auditing a course are charged the same tuition as those taking the course for credit. The University does distinguish, however, between a passive and active audit.

- Passive Audit (participating only by listening, viewing, and reading)
  - Active Audit (discussing, conducting laboratory work, practice teaching, participation in exams, etc.)
- The University reserves the right to assess a passive audit at a different rate from tuition for an active audit of the same course. Tuition assessments are due and payable each quarter at registration.*

**UNIVERSITY TUITION AND FEES PAYMENT POLICY**

This policy is applicable to all RFUMS students. Those who have received an approved deferral of tuition are not subject to tuition late fees; however, they may be subject to fees for late payments of any other nature.

1. Tuition and fees are due on the designated registration day (Monday) for each quarter. A five-day grace period for payment will be allowed including and ending on the Friday of the week in which registration day occurs.

2. Beginning on the following Monday, the sixth day, after the five-day grace period has expired, a late charge will be assessed for each day until paid, based upon a rate of 18% per annum computed on a day-to-day basis using a 365-day-year.
3. Students with outstanding balances still remaining at the end of the quarter will receive an incomplete grade in all courses in which the student was enrolled. The incomplete grade will be registered on their transcript and the reason for the incomplete grade will be noted (i.e. for non-payment of tuition and fees). Also, students who have not paid in full by the end of the quarter will not be allowed to register for the following quarter.

## REFUND OF TUITION

With written approval from the instructor and the Dean SGPS, a student may withdraw from a course. Tuition paid by the student for the course may be refundable at the University's discretion. Contact Student Financial Services for details.

## FINANCIAL ASSISTANCE

### STIPENDS AND TUITION WAIVERS

The School of Graduate and Postdoctoral Studies offers a limited number of graduate student tuition waivers and graduate student stipends to full-time students in good standing. The Dean of the School of Graduate and Postdoctoral Studies determines the stipend amount for graduate students. Graduate student stipends may be provided in part or in whole by individual departments. The annual stipend amount is the same for all students enrolled in the regular doctoral and combined degree programs, with the following exceptions:

- Graduate students who have acquired extramural grant support (ex NRSA) for graduate training may be paid a higher stipend amount in accord with the usual and customary support provided by the extramural funding agency.
  - For those graduate students who have extramural funding that provides partial stipend support, the stipend amount will be supplemented up to the current SGPS stipend amount for regular doctoral degree students.
  - The student's mentor and/or The School of Graduate and Postdoctoral Studies will provide the stipend supplement.
- Regular and combined degree graduate students who are recipients of scholarship funds (e.g. Distinguished Graduate Scholar) may receive an increased stipend amount as determined by the Dean.
- Students within master's degree programs may not receive stipend support, and if support is provided, the stipend amount may vary as determined by the Dean.
- When resources are limited, doctoral students are given preference over master's degree students.
- Students within the Faculty Doctoral Program are not provided stipend support.

### STUDENT LOAN PROGRAMS

To meet the cost of attending The School of Graduate and Postdoctoral Studies, students, spouses and parents are expected to provide financial support to the extent that they are able. When family resources are insufficient to meet college costs, students are encouraged to seek assistance. Refer to the RFUMS Financial Aid Office website for more information regarding financial resources.

### HEALTH INSURANCE

Health Insurance options for students of the School of Graduate and Postdoctoral Studies are the same as for employees of this University. Please see the Summary Plan Descriptions on the RFUMS Human Resources web and intranet pages. *\*Note that, while SGPS Students qualify for the employee benefits health insurance package, they may opt for the traditional student insurance packages.*

## STUDENT ORGANIZATIONS

### GRADUATE STUDENT ASSOCIATION

SGPS students at the University have organized a Graduate Student Association (GSA) to help meet their individual and group needs. The concerns of the GSA range from social and academic events to availability of library resources and evaluation of students' academic performance. Prospective students are invited to discuss GSA activities with its president, who may be reached through the Office of the Dean.

### UNIVERSITY STUDENT COUNCIL

Students in all schools participate in the University Executive Student Council. This group, organized and run entirely by students, concerns itself with the overall policy and direction of the institution as these relate to student concerns. In addition, the Council plans and supports campus social events and student delegate trips to national professional group meetings. It also names student representatives to school committees.

### PHYSICIAN SCIENTIST STUDENT ASSOCIATION

The goal of the PSSA is to address the unique interests and needs of, and serve as a voice for, the MD/PhD and DPM/PhD student population. This association provides forums for students to interact with successful physician-scientists to discuss career opportunities. This association also serves to foster increased interactions between students in different years of the program. Students pursuing a combined MD/PhD or DPM/PhD degree are automatically members of this organization.

## STUDENT POLICIES, STUDENT RECORDS AND STUDENT RESOURCES

Refer to the RFUMS Student Policies Handbook for information on topics which include:

### STUDENT CONDUCT POLICY

#### CAMPUS LIFE

#### EDUCATIONAL OPPORTUNITY POLICIES AND PROCEDURES

#### INFORMATION TECHNOLOGY SERVICES: PRINCIPLES AND POLICIES

#### MISSING PERSON POLICY

#### STUDENT HEALTH AND WELL-BEING

- I. ACCOMMODATIONS AND STUDENT DISABILITY
- II. EXPOSURE INCIDENTS
- III. IMMUNIZATION REQUIREMENTS AND RESOURCES
- IV. INSURANCE\*
  - Health Insurance
  - Dental and Vision Insurance

#### STUDENTS' PERSONAL AND ACADEMIC INFORMATION

- I. ACADEMIC PERIOD
- II. STUDENT RECORDS
- III. POLICY STATEMENTS AND GUIDELINES
  - Public Information
  - Confidential Information
  - Rights of Access and Review of Records
  - Limitation on Access
  - Supplementary Exceptions
  - Custodians of Student Records
  - Release of Grades
  - Right to Challenge Content of Records
  - Creation, Permanence, and Disposal of Student Records
  - Transferring Admissions Records to the Registrar's Office

**RESOURCES**

- I. BUSINESS SERVICES
- II. CAMPUS SECURITY
- III. DIVISION OF STUDENT AFFAIRS
  - Academic Support Services
  - Disability Support Services
  - Fitness and Recreation
  - Multicultural Student Services
  - Student Counseling Service
  - Student Housing
  - Student Life
  - Tutoring and Study Skills Assistance
- IV. FINANCIAL AID OFFICE
- V. FOOD SERVICE
- VI. INFORMATION TECHNOLOGY SERVICES
  - Desire2Learn (D2L)
  - Student E-mail
  - Student Housing Network and Telephone Access
  - Technology Purchase Information
  - WebAdvisor
  - Wireless Network Information
- VII. INSURANCE
  - Disability Insurance
  - Health Insurance
  - Malpractice Insurance
- VIII. LEARNING RESOURCES
  - Academic Computing Labs
  - Boxer University Library
  - Educational Technology
  - Information Commons
  - Presentation Practice Room
  - Small Group Rooms
  - 24-Hour Study Space
- IX. PARKING ON CAMPUS
- X. STUDENT COUNCIL AND STUDENT ORGANIZATIONS
- XI. STUDENT EMPLOYMENT
- XII. STUDENT HEALTH
- XIII. TRANSPORTATION OPTIONS
  - Airport Transportation
  - Metra Train Service
  - University Van Shuttle to Metra Station
  - Pace Bus Service

**GENERAL AND MULTI-DISCIPLINARY COURSE DESCRIPTIONS**

**MULTI-DISCIPLINARY COURSES**

**GMTD-709:** *Molecular and Cellular Sciences Seminar Series*

**Description:** REQUIRED For IGPBS - Internationally known biomedical scientists provide exciting seminars for all who are interested in attending. Meets monthly; 2<sup>nd</sup> Wednesday (September thru May). Graduate students are also invited to attend a lunch with these visiting speakers. Attendance is taken at each seminar and credit is issued based on overall attendance for the academic year.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Vertel

**INTERDISCIPLINARY GRADUATE PROGRAM IN BIOMEDICAL SCIENCES – FIRST YEAR COURSES**

**GIGP-500:** *First Year Lab Rotations*

**Description:** REQUIRED CORE COURSE for IGPBS – First year IGPBS students complete four self-selected laboratory rotations with research faculty. These approximately eight-week rotations are designed to introduce student and mentor in the laboratory setting with the goal of determining student/mentor match. At the end of the rotations, the student will select their thesis advisor from among those faculty members with whom the rotations were held.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** Each Term  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Lab Only  
**Course Director(s):** Dr. Intine

**GIGP-501:** *Molecular - Cell Biology I*

**Description:** REQUIRED CORE COURSE for IGPBS - Based on MBCH 502, this course consists of 32 formal MCB lectures plus six Physiology lectures; weekly student presentation and discussion of research papers; MD/PhD students also attend 2 clinical correlation lectures and participate in 2 integrated problem based learning sessions. In this course, the molecular and cellular processes common to all eukaryotic cells are studied and, where appropriate, comparisons to prokaryotic cells are made. The molecular and cellular processes of specific cell types and tissue types are also considered, and related to their morphological appearance. A unique aspect of the course is a self-teaching program that covers certain facts and concepts basic to biochemistry; this is an individual, self-learning, self-evaluation program.

**Credits:** 6  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture & Seminar/Discussion  
**Course Director(s):** Dr. Vertel

**GIGP-502:** *Molecular - Cell Biology II*

**Description:** REQUIRED CORE COURSE for IGPBS A continuation and expansion of the principles taught in Molecular - Cell Biology I, this course covers the following topics: protein structure and molecular recognition, enzyme action and adaptation principles of biomolecular action and regulation receptors, signal transduction, gene expression – pre-mRNA to targeted protein degradation, antibodies-structure and function, and current methods of cell biology.

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Mueller & Dr. Potashkin

**GIGP-503 (A, B, C, D):** *Systems Lectures*

**Description:** REQUIRED CORE COURSES for IGPBS - The Systems Lectures are a series of weeklong modules, each focussed on a particular disease and take the student from the disease's primary underlying mechanism (at the cellular level or gene level, if known) to the integrated, physiological systems level. The modules are a combination of lectures and/or directed paper discussions by faculty with expertise in a particular disease area.

**Credits:** 0.5 (each)  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Intine

**Section A:** *Fundamentals of Immunology* - **Director:** Dr. Re  
**Section B:** *Cystic Fibrosis* - **Director:** Dr. Bradbury & Dr. Bridges  
**Section C:** *Cancer* - **Director:** Dr. Sharma-Walia  
**Section D:** *Neurodegenerative Diseases* - **Director:** Dr. Marr

**GIGP-505:** *Cellular and Molecular Developmental Biology*

**Description:** ELECTIVE for IGPBS - Students must take a minimum of 1 elective option in their first year. This course will introduce the students to the prominent experimental model systems used today by developmental biologists and then focus on particular underlying developmental control mechanisms that are important to the processes of cell differentiation and morphogenesis. The course is made up of a combination of lectures and/or directed paper discussions by faculty with expertise in the various sub-topics of the course.

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Sarras

**GIGP-506:** *Systems Physiology*

**Description:** ELECTIVE for IGPBS - Students must take a minimum of 1 elective in their first year. The Systems Physiology elective includes the study of: cardiac, respiratory, renal, gastrointestinal and endocrine physiology. It is designed for graduate students who have successfully completed Molecular and Cell Biology 1 and 2, but require a more complete understanding of organ-systems physiology. Papers, discussions and presentations relevant to the system being presented may supplement the topics. Examinations are in written format. Nota bene: This course is required for those students also taking the Neuroscience elective. Those students studying toward the PhD degree with an advisor in Physiology and Biophysics will be required to complete the full course in Medical Physiology MMPH500

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Hawkins & Dr. Sukowski

**GIGP-507:** *The Art of Scientific Presentations*

**Description:** REQUIRED SPECIALTY COURSE for IGPBS - Students learn to improve their oral presentation skills by weekly presentations and by giving and receiving peer evaluation. The successful scientific career requires clear communication of scientific results. Participants in this course practice giving and evaluating oral presentations of technical material. Topics to be covered include organization of a talk, targeting the material to the appropriate level of the audience, overcoming "stage fright", effective visual aids, developing eye contact, effective use of voice, overcoming language barriers and handling question-and-answer sessions.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Walters

**GIGP-508:** *Ethics and Regulatory Issues in Biomedical Research*

**Description:** REQUIRED SPECIALTY COURSE for IGPBS - This course covers the major issues related to the responsible conduct of research in the biomedical sciences, including: overt falsification, fabrication, plagiarism (FFP); authorship and peer review guidelines; conflict of interest; mentor/trainee responsibilities, research with animal subjects, and human subject research. Online components include certification for using radioisotopes and working with vertebrate animal and human subjects. Lecture, discussions, and online modules.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture, Distance Education  
**Course Director(s):** Dr. Eliot

**GIGP-510:** *Computer Applications in Biomedical Research*

**Description:** REQUIRED SPECIALTY COURSE for IGPBS - Combination of lecture and hands-on application of computer databases and tools to research problems. Grading is based on student projects carried out during the quarter.

<b>Credits:</b>	2
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Fall
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. Walters

**GIGP-512:** *Neuroscience*

**Description:** ELECTIVE COURSE for IGPBS - IGPBS Students must take a minimum of 1 elective in their first year. This course, which is required for entry into both the Neuroscience and Pharmacology PhD programs, is divided into lecture and laboratory parts. Topics to be covered in the lecture portion include: the neurochemistry of transmitters, receptors, and second messenger systems; developmental neurobiology; and the neural systems underlying sensory, motor, affect, memory, language, and other high cognitive functions. The laboratory portion is focused on human neuroanatomy, and is taught through a combination of large-group lectures, wet labs, and small discussion sessions, employing a mixture of atlases, brain models, cadaver brains, and interactive computer programs. Students enrolled in this elective also must enroll in the spring term Systems Physiology (GIGP-506) elective.

<b>Credits:</b>	5
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Spring
<b>Instructional Method:</b>	Lecture-Lab
<b>Course Director(s):</b>	Dr. Marr

**GIGP-509:** *Biostatistics*

**Description:** REQUIRED SPECIALTY COURSE for IGPBS – Study of descriptive and inferential statistics with relevance to research will be included. Use of the computer for statistical analysis will be covered. There will be opportunity to use statistics for a small pilot project.

<b>Credits:</b>	2
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Spring
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. Henderson

**DEPARTMENTAL REQUIREMENTS AND COURSE DESCRIPTIONS**

**DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR BIOLOGY**

Degree Programs offered are PhD, MS, MD/PhD and DPM/PhD. The primary objective of these programs is to train students to become scientists capable of pursuing independent research. Students will be exposed to the latest interdisciplinary approaches to modern biochemical research by the nine investigators within the Department. Our research aims to elucidate the molecular bases of action of important biomedical systems ranging from receptors and transporters to enzymes in key pathways to protein-nucleic acid complexes needed for cell growth. The emphasis on the study of proteins (i) allows a common research bond and language among faculty, (ii) complements ongoing research in other CMS departments, (iii) coincides with the cutting edge of modern biomedical research, and (iv) provides teaching capability across a spectrum of biochemical topics.

**DEGREE REQUIREMENTS FOR ALL PHD TRACKS**

Entry into the PhD training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Doctoral Candidacy Exam, thesis proposal, successive progress reviews, and thesis defense. The PhD will be granted upon successful completion of the following requirements, as well as the thesis defense and publication.

**DEPARTMENT REQUIREMENTS FOR PHD DEGREE** (following completion of IGPBS Core Coursework)

**ADVANCED COURSEWORK REQUIREMENTS**

- GBCH-600A/B** Biochemical Pathways (fall/winter)
- GBCH-543** Enzyme Structure and Mechanisms (spring 2<sup>nd</sup> or 3<sup>rd</sup> year)\*
- GBCH-544A/B** Physical Biochemistry (winter/spring 2<sup>nd</sup> or 3<sup>rd</sup> year)\*
- GBCH-599** Pre-Candidacy Research Activities

*\*offered on alternate years*

Candidacy examination offered at the end of the second year will only cover the courses that the student has taken up until that point.

**TEACHING REQUIREMENTS**

None

**DEPARTMENT PROGRAM REQUIREMENTS: SECOND YEAR THROUGH GRADUATION**

- GBCH-699** Post-Candidacy Doctoral Research Activities
- GBCH-532** Biochemistry and Molecular Biology Journal Club
- GBCH-533** Biochemistry and Molecular Biology Seminar

**ELECTIVE SEMINARS**

- GMTD-709** MCS Seminar Series (2<sup>nd</sup> Wednesday of each month)

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by each Student's Research Committee, with approval by the Dean.

**DEPARTMENT REQUIREMENTS FOR MASTER OF SCIENCE DEGREE** (following completion of IGPBS Core Coursework)

Master of Science programs are tailored to each candidate. The following minimum requirements must be met before the candidate will be eligible for the degree. Entry into the MS training program follows successful

completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Candidacy Exam, thesis proposal, progress review, and thesis defense. The MS will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

**ADVANCED COURSEWORK REQUIREMENTS**

- GBCH-599** Pre-Candidacy Research Activities
- GBCH-600A/B** Biochemical Pathways (fall/winter)
- GBCH-543** Enzyme Structure and mechanisms (spring 2<sup>nd</sup> or 3<sup>rd</sup> year)\*
- GBCH-544A/B** Physical Biochemistry (A-winter/B-spring 2<sup>nd</sup> or 3<sup>rd</sup> year)\*

\*offered on alternate years

**TEACHING REQUIREMENTS**

None

**DEPARTMENT PROGRAM REQUIREMENTS: SECOND YEAR THROUGH GRADUATION**

- GBCH-531** Master's Research in Biochemistry and Molecular Biology
- GBCH-532** Biochemistry and Molecular Biology Journal Club
- GBCH-533** Biochemistry Seminar (Departmental seminars)

**GRADUATE FACULTY**

- Chair:** Marc J. Glucksman, PhD, Professor  
 Jun-yong Choe, PhD, Assistant Professor  
 Carl C. Correll, PhD, Associate Professor  
 Adrian Gross, MD, Associate Professor  
 Ronald S. Kaplan, PhD, Professor, Vice President for Research (RFUMS) and Vice Dean of Research (CMS)  
 Min Lu, PhD, Assistant Professor  
 David M. Mueller, PhD, Professor  
 Kenneth E. Neet, PhD, Professor and Associate Dean for Research  
 Kyoung Joon Oh, PhD, Assistant Professor  
 Xinli Yang, PhD, Research Assistant Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

- GBCH-530** *Master's Thesis in Biochemistry*
- Description:** After completing coursework, the student writes his/her thesis.
- Credits:** 1 - 12
- Grading Structure:** P/F
- Grade Assigned:** At Term Completion
- Term(s):** Fall Winter Spring Summer
- Instructional Method:** Research
- Course Director(s):** Dr. Correll and Dr. Glucksman

**GBCH-531**      *Master's Research in Biochemistry*

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Correll and Dr. Glucksman

**GBCH-532:**    *Biochemistry and Molecular Biology Journal Club*

**Description:** Presentations on current literature or personal research by faculty, staff and students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Correll

**GBCH-533:**    *Biochemistry and Molecular Biology Seminar*

**Description:** Presentations on current research by invited speakers.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Correll

**GBCH-543:**    *Enzyme Structure and Mechanism*

**Description:** This is a course of lectures, student presentations and seminars by outside speakers on aspects of enzymology. The following subjects are covered: protein sequence methodology, X-ray crystallography, computer graphic modeling, chemical and enzyme kinetics including regulatory kinetics, enzyme mechanisms, chemical modification of enzymes, and site-directed mutagenesis. Offered every other year, alternating with GBCH-544. Prerequisite: GBCH-600A

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Choe and Dr. Lu

**GBCH-544 A&B:** *Physical Biochemistry I & II*

**Description:** - This course deals with the physical chemical properties of biological macromolecules and the techniques used for their characterization. Topics include: molecular weight, hydrodynamic properties, and spectroscopic properties of proteins and nucleic acids; secondary structure, tertiary structure, and conformational changes of proteins; dynamics of protein-protein and protein-DNA interactions; and kinetics and thermodynamics of protein folding. Offered every other year, alternating with GBCH-543. Prerequisite: GBCH-600A

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Series Completion  
**Term(s):** Winter Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Drs. Oh and Correll

**GBCH-550:** *Medical Physiological Biochemistry*

**Description:** - The fundamental physiological and biochemical properties that mediate reactions of the various compounds important to the normally functioning human organism are studied. Abberations that lead to pathology and disease are focused upon in conjunction with the normal functioning. Many clinical vignettes illustrate the basic mechanisms of life processes at both the cellular and molecular levels. (Course Director Permission Required)

**Credits:** 5  
**Grading Structure:** ABCF  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Glucksman

**GBCH-599:** *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GBCH-537)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Correll and Dr. Glucksman

**GBCH-600A&B:** *Biochemical Pathways I & II*

**Description:** The fundamental chemical properties and biological reactions of the various compounds important to the normally functioning human organism are studied. As far as possible, mechanisms of life processes at the cellular and molecular level are explained in terms of these properties.

**Credits:** 7 Fall Term, 2 Winter Term  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Glucksman

**GBCH-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GBCH-535)

<b>Credits:</b>	1 - 12
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Fall Winter Spring Summer
<b>Instructional Method:</b>	Research
<b>Course Director(s):</b>	Dr. Correll and Dr. Glucksman

## DEPARTMENT OF CELL BIOLOGY AND ANATOMY

The program in Cell Biology and Anatomy offers graduate study leading to the M.S. and PhD degrees. In addition, we participate in combined degree programs offered by our affiliated Schools in the University, leading to the MD/PhD and DPM/PhD degrees. These programs provide essential training for careers that would include faculty positions at research and/or educational institutions, and for research positions in the biotechnology and pharmaceutical industry.

### DEGREE REQUIREMENTS - PHD TRACK

Entry into the PhD training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, candidacy exam, thesis proposal, progress review, and thesis defense. The PhD will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

### DEPARTMENT REQUIREMENTS FOR PHD DEGREE (FOLLOWING COMPLETION OF IGPBS CORE COURSEWORK)

#### ADVANCED COURSES - REQUIRED

- GCBA-600**      Advanced Cell Biology (winter)
- GCBA-604**      Techniques in Cell Biology (fall)

#### ADVANCED COURSES - ELECTIVE

- GCBA-500A/B**    Clinical Anatomy - Selected Modules (fall/winter/spring)
- GCBA-502A/B**    Histology - Selected Modules (fall/winter/spring)
- GCBA-504**      Embryology (fall)
- GCBA-602**      Special Topics in Cell Biology
- GCBA-605**      Special Topics in Developmental Biology (spring)

Departmental graduate students also have the opportunity to participate as Teaching Assistants in at least one course offered by the department, typically Gross Anatomy or Histology.

#### DEPARTMENT PROGRAM REQUIREMENTS

- GCBA-599**      Pre-Candidacy Research Activities
- GCBA-699**      Post-Candidacy Doctoral Research Activities
- GCBA-533**      Cell Biology and Anatomy Seminars
- GCBA-532**      Cell Biology and Anatomy Journal Club
- GMTD-709**      MCS Seminar Series (2<sup>nd</sup> Wednesday each month)

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by each Student's Research Committee, with approval by the Dean.

#### DEPARTMENT REQUIREMENTS FOR MASTER OF SCIENCE DEGREE

Master of Science programs are tailored to each candidate. The following minimum requirements must be met before the candidate will be eligible for the degree. Entry into the MS training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Candidacy Exam, thesis proposal, progress review, and thesis defense. The MS will be granted upon successful completion of all coursework recommended by the research committee as well as thesis defense and publication.

**GRADUATE FACULTY**

**Chair:** William Frost, PhD, Professor  
 Christopher Brandon, PhD, Associate Professor  
 Joseph DiMario, PhD, Professor  
 Mirek Dundr, PhD, Assistant Professor  
 Michelle Hastings, PhD, Assistant Professor  
 Evan Hill, PhD, Research Assistant Professor  
 Robert Intine, PhD, Assistant Professor  
 Hongkyun Kim, PhD, Assistant Professor  
 Monica Oblinger, PhD, Professor  
 Hyun (Kelly) Oh, PhD, Research Assistant Professor  
 Michael Sarras, Jr., PhD, Professor  
 Barbara Vertel, PhD, Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

**GCBA-500 (A&B):** *Clinical Anatomy*

**Description:** In this course, human anatomy is studied by using a regional approach that also includes functional and clinical correlations. Laboratory time is devoted exclusively to the regional dissection of a human cadaver. Supplementary offerings within the course include computerized images, guides and videos, prosected cadavers and bone sets for individual study.

**Credits:** 11  
**Grading Structure:** ABCF  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Lecture/Lab  
**Course Director(s):** Dr. Manion

**GCBA-502 (A&B):** *Histology*

**Description:** The principal educational goal of this course is an understanding of organ structure and organ function through the detailed study of light microscopic preparations and electron micrographs.

**Credits:** 5  
**Grading Structure:** ABCF  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Lecture/Lab  
**Course Director(s):** Dr. Brandon

**GCBA-504:** *Embryology*

**Description:** The development of the human from conception to delivery is examined. Emphasis is placed on mechanisms of normal development and clinically-relevant abnormal development.

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. DiMario

**GCBA-530**      *Master's Thesis Cell Biology and Anatomy*

**Description:** After completing coursework, the student writes his/her thesis.

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Frost

**GCBA-532:**    *Cell Biology and Anatomy Journal Club*

**Description:** Presentations on current literature or personal research by faculty, staff and students. This is a required course for all Cell Biology and Anatomy doctoral students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Vertel

**GCBA-533:**    *Cell Biology and Anatomy Seminar*

**Description:** Presentations on current research by invited speakers. This is a required course for all Cell Biology and Anatomy doctoral students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Hastings

**GCBA-551:**    *Basic Electron Microscopy Technique*

**Description:** Basic Electron Microscopy Technique.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Varies  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Brandon

**GCBA-599:**    *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GCBA-537)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Frost

**GCBA-600:**    *Advanced Cell Biology*

**Description:** Advanced treatment of key topic areas in modern cell biology. Course involves critical evaluation of primary literature and discussion with concentrations in nuclear organization, gene expression, cell trafficking, mitosis, meiosis, cell cycle, apoptosis, extracellular matrix, cancer and metastatic disease. This is a required course for all Cell Biology and Anatomy doctoral students.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Hastings

**GCBA-602:** *Special Topics in Cell Biology*

**Description:** Topics of current interest in Cell Biology will be covered in a format that involves primary literature and discussion as well as a didactic component (Course Director Permission Required)

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Varies  
**Instructional Method:** Discussion  
**Course Director(s):** Dr. Vertel

**GCBA-604:** *Techniques in Cell Biology*

**Description:** Theory and application of fundamental techniques used to visualize cells and cellular processes. Course is partly didactic and partly student participation/observation of techniques for: tissue cultures, live cell imaging, electron microscopy, immunocytochemistry, confocal microscopy, visualizing molecules. This is a required course for all Cell Biology and Anatomy doctoral students.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture-Lab  
**Course Director(s):** Dr. Dundr

**GCBA-605:** *Special Topics in Developmental Biology*

**Description:** Current topics of particular interest in the field of developmental biology with emphasis in discussion of current literature and relevance to the conceptual framework of the field.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Discussion  
**Course Director(s):** Dr. DiMario

**GCBA-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GCBA-535)

<b>Credits:</b>	1 - 12
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Fall Winter Spring Summer
<b>Instructional Method:</b>	Research
<b>Course Director(s):</b>	Dr. Frost

## DEPARTMENT OF CELLULAR AND MOLECULAR PHARMACOLOGY

Graduate training in the Department of Cellular and Molecular Pharmacology provides students with the opportunity to gain comprehensive instruction covering all areas in pharmacology. Students are expected to develop and carry out their own research project while receiving individual mentorship from their thesis advisor and research committee. During the program, students will get involved in teaching pharmacology, learn to write grant proposals, and attend and present work at local and national scientific meetings. Career opportunities for those holding the doctorate in Cellular and Molecular Pharmacology are outstanding and cover a wider spectrum than those of most other medical sciences.

Areas of research strength in the department:

- Drug addiction, Parkinson's disease, Schizophrenia
- Neurodegeneration
- Neurobiology of normal and aberrant learning; Neurobiology of emotion and behavior
- Neuronal plasticity, Synaptic integration, Ion channel function
- Basal ganglia anatomy, physiology, and function
- Gene expression; Regulation of alternative splicing
- Neuronal morphology and ultrastructure; Actin cytoskeleton regulation

Departmental research facilities and approaches are devoted to a wide-range of molecular, physiological, genetic, anatomical, and behavioral techniques.

- Cell culture
- *In vivo* and *in vitro* electrophysiology
- Protein and mRNA quantification; In situ hybridization; RT-PCR
- Electron microscopy; Fluorescence microscopy; Morphological reconstruction
- Behavioral assays (drug self-administration, locomotor behavior, anxiety, startle, etc...)

### DEGREE REQUIREMENTS – PHD TRACK

Entry into the PhD training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Doctoral Candidacy Exam, thesis proposal, progress review, and thesis defense (see page 17). The PhD will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

**DEPARTMENT REQUIREMENTS FOR PHD DEGREE** (following completion of IGPBS Core Coursework)

#### ADVANCED COURSES – REQUIRED

<b>GCMP-605</b>	Pharmacology Core
<b>GCMP-601</b>	Neuropharmacology I
<b>GCMP-602</b>	Neuropharmacology II

**AT LEAST ONE (1) OPTIONAL COURSE OFFERED BY OUR OR OTHER DEPARTMENTS, SUCH AS:**

<b>GNSC-607</b>	Neuronal Signaling (Neuroscience)
<b>GNSC-606</b>	Neurodegeneration (Neuroscience)
<b>GNSC-600</b>	Neurophysiology (Neuroscience)

#### TEACHING REQUIREMENTS

<b>GCMP-700</b>	Teaching in Pharmacology
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**DEPARTMENT PROGRAM REQUIREMENTS**

- GCMP-502** Journal Club in Cellular and Molecular Pharmacology
- GCMP-509** Seminars in Cellular and Molecular Pharmacology
- GCMP-599** Pre-Candidacy Research Activities
- GCMP-699** Post-Candidacy Doctoral Research Activities
- GMTD-709** MCS Seminar Series (2<sup>nd</sup> Wednesday each month)

**CMP ELECTIVES** (Students are encouraged to take at least one elective)

- GNSC-605** Techniques in Microscopy (Neuroscience)
- GNSC-505** Brain Dissection (Neuroscience)
- GCMP-545** Advanced Molecular Pharmacology

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by each Student’s Research Committee, with approval by the Dean.

**GRADUATE FACULTY**

**Chair:** Heinz Steiner, PhD, Professor  
 Joanna Dabrowska, PhD, PharmD, Assistant Professor  
 Patricia Loomis, PhD, Research Assistant Professor

Judith Potashkin, PhD, Professor  
 J. Amiel Rosenkranz, PhD, Associate Professor  
 Ann Snyder, PhD, Associate Professor  
 Kuei-Yuan Tseng, MD, PhD, Associate Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

**GCMP-502:** *Journal Club in Cellular and Molecular Pharmacology*

**Description:** Consists of informal presentation and discussion of current and novel literature in pharmacology. May be repeated for credit.

- Credits:** 1
- Grading Structure:** P/F
- Grade Assigned:** At Series Completion
- Term(s):** Fall Winter Spring
- Instructional Method:** Seminar/Discussion
- Course Director(s):** Dr. Tseng

**GCMP-509:** *Seminars in Cellular and Molecular Pharmacology*

**Description:** Internationally-recognized scientists present their most recent research. Students meet for lunch with the speakers, allowing for informal interactions. May be repeated for credit.

- Credits:** 1
- Grading Structure:** P/F
- Grade Assigned:** At Series Completion
- Term(s):** Fall Winter Spring
- Instructional Method:** Seminar/Discussion
- Course Director(s):** Dr. Potashkin

**GCMP-545:** *Advanced Molecular Pharmacology*

**Description:** Series of Lectures focusing on (1) basic principles in pharmacokinetics and pharmacodynamics, including signal transduction and and receptor pharmacology (2) pharmacogenomics and gene therapy (3) drug structure/activity relationships, small molecule drug design, molecular mechanism and drug targets, and molecular basis of drug resistance. Problem solving exercise and references will accompany discussion/lectures

**Credits:** 1-4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Lab Only  
**Course Director(s):** Dr. Potashkin

**GCMP-599:** *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GCMP-539)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Rosenkranz

**GCMP-601:** *Neuropharmacology I*

**Description:** Lectures present a comprehensive overview of the cellular foundations of neuropharmacology, techniques used in neuropharmacology, and experimental design. Principles of excitable membranes and ion channels will be discussed. Subject matters are covered in lectures and with interactive problem-solving approaches. These lectures will provide a background to the topics covered in GCMP601 Neuropharmacology II.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Rosenkranz

**GCMP-602:** *Neuropharmacology II*

**Description:** Lectures focus on neurotransmitter systems and how these participate on specific behaviors and disease states. Final lecture will integrate basic neuropharmacology research with the translational aspects of drug discovery. Scholarly publications will accompany discussion lectures.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Rosenkranz

**GCMP-605:** *Pharmacology Core*

**Description:** This course will introduce students to the basic principles of drug action. The first quarter will cover basic principles of the autonomic drugs and the therapeutic uses, side effects, and interactions of prostaglandins, NSAIDs, and central nervous system agents. The second quarter will continue the study of selected drug categories, including antimicrobials, anti cancer drugs, general and local anesthetics, cardiac drugs, and sedative/hypnotics. The third quarter will continue with drug categories that include endocrine and metabolic modulators, and treatment of asthma. Subject matters are covered in lectures, tutorials, and discussions.

**Credits:** 6  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Snyder

**GCMP-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GCMP-535)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Rosenkranz

**GCMP-700:** *Teaching in Pharmacology*

**Description:** Part of our mission is to prepare students for academic and educational positions. Students will be trained in teaching strategies and will serve as facilitators in the Medical Pharmacology small-group problem-solving sessions, and as lecturers in the Basic Biomedical Science pharmacology review sessions.

May be repeated for credit

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Potashkin

## DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY

The Department of Microbiology and Immunology offers advanced degree programs leading to the MD/PhD, DPM/PhD, and PhD in Microbiology and Immunology. These programs prepare candidates for careers in research and teaching in the field of modern microbiology and immunology.

The aim of the graduate training program is to develop competent researchers and teachers in all fields of medical microbiology and immunology. Emphasis is placed on helping the student explore creative potential and develop essential research skills and teaching competence that will enable him/her to secure a faculty appointment in a medical or related health professions' school, or a position as a research scientist in a biomedical research institute or in the biotechnology and/or pharmaceutical industry. The department offers formal courses covering both basic and clinical microbiology and immunology and specializes in advanced teaching of immunology, molecular biology, clinical immunology, molecular virology, cell biology, parasitology, and molecular parasitology.

The PhD in Microbiology and Immunology will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

### DEGREE REQUIREMENTS – PHD TRACK

Entry into the PhD training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Doctoral Candidacy Exam, thesis proposal, progress review, and thesis defense. The PhD will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

### DEPARTMENT REQUIREMENTS FOR PHD DEGREE (following completion of IGPBS Core Coursework)

#### COMPLETION OF CORE COURSES

- GMIC-600 A & B** Medical Microbiology and Immunology (PhD students) (fall/winter)
- MMIC 600 A & B** Medical Microbiology and Immunology (MD/PhD students) (fall/winter)
- GMIC-605** Molecular Biology Techniques (fall)

#### COMPLETION OF TWO (2) ADVANCED COURSES FROM THE FOLLOWING LIST:

- GMIC-503** Virology (spring)
- GMIC-560** Advanced Immunology (spring)
- GMIC-606** Cancer Biology and Signaling (winter)

#### ADDITIONAL PROGRAM REQUIREMENTS – participation required in all quarters

- GMIC-532** Journal Club
- GMIC-533** Microbiology and Immunology Seminar
- GMTD-709** MCS Seminar Series (2nd Wednesday each month)

#### RESEARCH (Participation required in all quarters)

- GMIC-599** Pre-Candidacy Research Activities
- GMIC-699** Post-Candidacy Doctoral Research Activities

#### OPTIONAL ADVANCED COURSES

- GMIC-510** Introductory Immunology (fall)
- GMIC-520** Molecular Parasitology (winter)
- GMIC-542** Selected Topics of Microbiology, Virology, Parasitology, Immunology, and Molecular Biology
- GMIC-549** Flow Cytometry Techniques

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by each Student's Research Committee, with approval by the Dean.

**GRADUATE FACULTY**

- Chair:** Bala Chandran, PhD, Professor  
 Kenneth Beaman, PhD, Professor  
 Kwang-Poo Chang, PhD, Professor  
 David Everly, PhD, Assistant Professor  
 Michael Fennewald, PhD, Associate Professor  
 Alice Gilman-Sachs, PhD, Associate Professor  
 Fabio Re, PhD, Associate Professor  
 Joseph Reynolds, PhD, Assistant Professor  
 Neelam Sharma-Walia, PhD, Assistant Professor  
 Gulam Waris, PhD, Assistant Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

**GMIC-503:** *Virology*

**Description:** This course covers fundamental animal virology including virus structure, classification, replication and genetics. Viruses of current interest that produce human disease (for example, HIV) will be discussed. Other topics may include molecular mechanisms of viral latency, role of viruses in oncogenesis, emerging viral infections of man and viruses and gene transfer vectors in human gene therapy. The course is lecture-based and discussion of original research articles. Spring Quarter.

- Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Waris

**GMIC-510:** *Introductory Immunology*

**Description:** This course is appropriate for non-microbiology and immunology majors who have had no formal training in immunology or who wish to review the fundamentals in preparation for the Advanced Immunology course. An overview of specific and nonspecific immunity, structure and function of immunoglobulins, molecular basis of antibody diversity, T cell and B cell differentiation, cell-cell interactions in the immune response, humoral and cell-mediated immunity, lymphokines and mediators, immunogenetics and major histo-compatibility complexes, complement, inflammation, hypersensitivity, autoimmune and immunodeficiency diseases, tumor immunology and transplantation immunology are among the topics discussed

- Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Gilman-Sachs

**GMIC-520:** *Molecular Parasitology*

**Description:** This course involves theoretical and practical aspects of applying new biological technology to study parasites and parasitic mechanisms of major tropical diseases. Emphasis is on molecular biology (especially DNA and RNA interactions). The depth of coverage depends on the prior training of the participants. Students are expected to actively participate in discussing recent literature as well as in project-oriented research. Research topics may be directed to the background or training and interests of the students.

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Chang

**GMIC-530:** *Master's Thesis in Microbiology and Immunology*

**Description:** Research

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Gilman-Sachs

**GMIC-532:** *Journal Club*

**Description:** Faculty, post-doctoral fellows, and students discuss current research effort. Participants present their 'work in progress' in an informal presentation, which includes an introduction to the field of interest. This series covers topics of research currently being pursued in the department, and is geared towards learning of each other's work and assisting one another in defining science and presentation skills.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Sharma-Walia

**GMIC-533:** *Seminar in Microbiology and Immunology*

**Description:** Presentations on current research in the field of Microbiology and Immunology by invited speakers, faculty and students. Required of all Microbiology and Immunology students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Everly

**GMIC-542:** *Selected Topics in Microbiology, Virology, Parasitology, Immunology, and Molecular Biology*

**Description:** Selected topics Microbiology, Virology, Parasitology, Immunology and Molecular Biology will be discussed. Topics for discussion will be announced three months in advance.

**Credits:** 1 - 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** To be arranged with faculty

**GMIC-549:** *Flow Cytometric Techniques*

**Description:** Students learn flow cytometric technology including immunophenotyping, cell sorting, DNA kinetics and cellular ploidy analysis.

**Credits:** 1  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture/Lab  
**Course Director(s):** Dr. Gilman-Sachs

**GMIC-560:** *Advanced Immunology*

**Description:** This course is intended for graduate students who have already taken GMIC 600A, *Medical Microbiology and Immunology*. The Advanced Immunology Course will focus on issues related to host-pathogen interaction and response to infection. Particular emphasis will be given to innate immunity and inflammation. Aberrant immune responses that cause pathologies not related to infections (i.e. autoimmunity, allergy, etc) will also be examined. Rather than analyzing each component of the immune response in isolation, the course's goal is to emphasize how several responses are simultaneously activated in the course of an infection and how they affect each other and the whole organism. Lecture/Seminar.

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Re

**GMIC-599:** *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GMIC-539)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Gilman-Sachs

**GMIC-600A:** *Medical Microbiology and Immunology*

**Description:** GMIC 600A - Medical Microbiology and Immunology This course consists of two parts: [1] ~ 55 Lectures of relevance from Medical Microbiology and Immunology (MMIC 600 A-B) taken along with medical students on immunology, basic bacteriology and pathogenic bacteria. [2] Student's review, presentation and discussion of latest articles related to subjects of the lectures. Evaluation will be based on essay type exams, topic papers oral presentation and discussion of articles. (Immunology)

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Reynolds

**GMIC-600B:** *Medical Microbiology and Immunology*

**Description:** GMIC 600B- Medical Microbiology and Immunology This course consists of two parts: [1] ~ 55 Lectures of relevance from Medical Microbiology and Immunology (MMIC 600 A-B) taken along with medical students on immunology, basic bacteriology and pathogenic bacteria. [2] Student's review, presentation and discussion of latest articles related to subjects of the lectures. Evaluation will be based on essay type exams, topic papers oral presentation and discussion of articles. (Microbiology)

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Fennewald

**GMIC-605:** *Molecular Biology Techniques*

**Description:** This course will give students a working knowledge of various molecular experimental approaches and to understand the advantages and limitations of each. Fall Quarter, two hours per week.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Everly

**GMIC-606:** *Cancer Biology and Signaling*

**Description:** This course covers the basic biology of cancer at the cellular level and molecular levels with special emphasis on aberrant signal transduction in cancer cells. The course involves lectures and discussion of original research/review articles. Winter Quarter, two hours per week.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Sharma-Walia

**GMIC-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GMIC-535)

<b>Credits:</b>	1 - 12
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Fall Winter Spring Summer
<b>Instructional Method:</b>	Research
<b>Course Director(s):</b>	Dr. Gilman-Sachs

## DEPARTMENT OF NEUROSCIENCE

Graduate training in Neuroscience is coordinated by the Interdepartmental Neuroscience PhD Program (IDNP), which includes all faculty members in the Dept. of Neuroscience as well as approximately 20 faculty members from four other basic science departments whose research interests are in nervous system-related topics. (Other participating departments include Cellular and Molecular Pharmacology, Physiology and Biophysics, Cell Biology and Anatomy, and Biochemistry and Molecular Biology).

### DEGREE REQUIREMENTS – PHD TRACK

Entry into the PhD training program follows successful completion of the IGPBS core year, including the Neuroscience and Physiology Electives in the Spring Quarter. Further advancement follows the SGPS Advanced Phase timeline for the selection of research committee, Doctoral Candidacy Exam, thesis proposal, progress review, and thesis defense. The PhD will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

### IDNP REQUIREMENTS FOR PHD DEGREE (following completion of IGPBS Core Coursework)

#### ADVANCED COURSEWORK REQUIREMENTS

<b>GNSC-600</b>	Neurophysiology
<b>GNSC-606</b>	Neurodegeneration
<b>GNSC-607</b>	Neuronal Signaling
<b>GCMP-601</b>	Neuropharmacology I
<b>GCMP-602</b>	Neuropharmacology II
<b>GNSC-605</b>	Techniques in Microscopy
<b>GNSC-505</b>	Human Brain Dissection

#### TEACHING REQUIREMENTS

<b>GNSC-570</b>	Neuroscience Teaching Assistant
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#### ADDITIONAL IDNP REQUIREMENTS

<b>GNSC-599</b>	Pre-Candidacy Research Activities
<b>GNSC-699</b>	Post-Candidacy Doctoral Research Activities
<b>GNSC-553</b>	Neuroscience Journal Club
<b>GNSC-504</b>	Neuroscience Seminar
<b>GMTD-709</b>	MCS Seminar Series

#### ELECTIVE SEMINARS AND JOURNAL CLUBS

<b>GCMP-502</b>	CMP Journal Club (required for Neuropharmacology Track)
<b>GCMP-509</b>	Seminar in Pharmacology (required for Neuropharmacology Track)

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by each Student's Research Committee, with approval by the Dean.

#### NEUROPHARMACOLOGY TRACK

For students seeking a degree in Neuroscience (PhD or MD/PhD or DPM/PhD), but whose mentors are members of the Department of Cellular and Molecular Pharmacology, a second track is offered, emphasizing Neuropharmacology. The requirements for this track are similar to the regular Interdepartmental Neuroscience Program, except for the addition of one required course, Pharmacology Core (GCMP-605), which replaces Human Brain Dissection (GNSC-505) and Techniques in Microscopy (GNSC-605). The latter two courses may be taken as electives. Another difference is that the teaching requirement for the Neuropharmacology Track is GCMP-700, Teaching in Pharmacology, in lieu of GNSC-570. The required Journal Club is GCMP-502, and

the required Seminar Series is GCMP-509, although these may be adjusted based on the needs of individual students.

**GRADUATE FACULTY**

**Chair:** Marina Wolf, PhD, Professor  
 Lise Eliot, PhD, Associate Professor  
 Robert Marr, PhD, Assistant Professor  
 Daniel Peterson, PhD, Professor  
 Grace (Beth) Stutzmann, PhD, Associate Professor  
 Anthony West, PhD, Associate Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

**GNSC-504:** *Neuroscience Seminar*

**Description:** Presentations on current research in the field of Neuroscience by invited speakers. Required of all Neuroscience PhD and Combined Degree students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Daniel Peterson

**GNSC-505:** *Human Brain Dissection*

**Description:** An intensive short course, where students will carry out a detailed dissection of a human cadaver brain. This dissection will expose them to all the major areas of the human forebrain, brainstem, and cerebellum, including major fiber tracts, subcortical nuclei, and their connections to brainstem and cortical structures. Special emphasis will be placed on human limbic structures and the circuitry underlying emotion, addiction, and other psychiatric disorders.

**Credits:** 1  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lab Only  
**Course Director(s):** Dr. Eliot

**GNSC-553:** *Neuroscience Journal Club*

**Description:** Presentations on current literature, personal research and newsworthy developments in neuroscience by faculty, staff and students. Required of all Neuroscience PhD and Combined Degree students

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Marr

**GNSC-570:** *Neuroscience Teaching Assist.*

**Description:** Prepare and lead weekly small-group sessions to help teach neuroanatomy to first-year medical

students in the Medical Neuroscience Course (MNSC 502). May be repeated for credit.

**Credits:** 4  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Eliot

**GNSC-599:** *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Hours and units to be arranged. (formerly GNSC-539)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Eliot

**GNSC-600:** *Neurophysiology*

**Description:** A thorough review of neurophysiological function, including the ionic basis of the neuronal membrane potential and action potentials, pre- and post-synaptic signaling, cable properties, integrative properties, and synaptic plasticity.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Stutzmann

**GNSC-605:** *Techniques in Microscopy*

**Description:** A comprehensive "hands-on" instruction to state-of-the-art microscopy and design-based stereology. Lectures cover the fundamentals of tissue preparation and staining, microscopy, digital imaging and confocal stereology. Approximately half of the course time is spent using the equipment.

**Credits:** 1 - 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture-Lab  
**Course Director(s):** Dr. Peterson

**GNSC-606:** *Neurodegeneration*

**Description:** Mechanisms of brain death and neuronal degeneration resulting from chronic or acute diseases and their prospects for recovery. Topics include the clinical features and animal models of traumatic brain injury, stroke, spinal cord injury, Parkinson's, Alzheimer's and Huntington's diseases.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. West & Dr. Marr

**GNSC-607:** *Neuronal Signaling*

**Description:** This course covers intracellular signaling mechanisms including G proteins, phosphoinositides, cyclic nucleotides, calcium, serine and threonine phosphorylation, and tyrosine phosphorylation. Faculty will present basic information on each topic. Students are responsible for leading discussions based on the text and journal articles.

**Credits:** 2  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Wolf

**GNSC-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Hours and units to be arranged. (formerly GNSC-535)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Eliot

## DEPARTMENT OF PHYSIOLOGY AND BIOPHYSICS

The Department of Physiology and Biophysics offers advanced degree programs leading to the PhD, MD/PhD, and DPM/PhD in Physiology and Biophysics. These programs prepare candidates for successful careers in biomedical research and education.

Among the programs within the School of Graduate and Postdoctoral Studies, the Department of Physiology and Biophysics is uniquely focused on an integrative approach to biomedical research, using the tools of genetics, molecular biology, cell biology and biochemistry to understand the integrated functions of cells, tissues and organisms. Our program offers students the opportunity to interact with multiple well-funded investigators with international reputations. Emphasis is placed on supporting students as they explore their creative potential and develop skills and knowledge essential for their career development, whether it be as a faculty member in a graduate or medical school, undergraduate campus, or research scientist in a biotechnology or pharmaceutical-related field. The department offers formal courses covering both basic and clinical physiology, and specializing in advanced transport and cellular physiology. Training of students within Physiology and Biophysics is a rich experience going far beyond formal classroom training, including journal clubs, research conferences, and the opportunity to present data at national and international meetings.

### DEGREE REQUIREMENTS – PHD TRACK

Entry into the PhD training program follows successful completion of the IGPBS core year and follows the SGPS Advanced Phase timeline for selection of research committee, Doctoral Candidacy Exam, thesis proposal, progress review, and thesis defense. The PhD will be granted upon successful completion of the following requirements, as well as thesis defense and publication.

### DEPARTMENT REQUIREMENTS FOR PHD Degree (following completion of IGPBS Core Coursework)

#### ADVANCED COURSEWORK REQUIREMENTS

- GPHY-500 A/B/C** Medical Physiology (fall/winter/spring)
- GPHY-599** Pre-Candidacy Research Activities
- GPHY-699** Post-Candidacy Doctoral Research Activities

#### ADVANCED COURSEWORK (ELECTIVES)

- GPHY-508** Writing Skills (summer)
- GPHY-512** Physiology of the Autonomic Nervous System (fall)
- GPHY-513** Pulmonary Pathophysiology (winter)
- GPHY-514** Physiology of the Liver (winter)
- GPHY-516** Cardiovascular Pathophysiology (fall)
- GPHY-542** Electrogenic Ion Pumps (winter)
- GPHY-618** Molecular Biophysics of Ion Channels (spring)

#### TEACHING REQUIREMENTS

- GPHY-534** Teaching Methods (Fall/Winter/Spring)  
Physiology Problem Sets for MPHY 500 A, B & C

#### DEPARTMENT PROGRAM REQUIREMENTS

- GMTD-711** Physiology and Biophysics Journal Club
- GPHY-505** Physiology and Biophysics Seminar

**ELECTIVE SEMINARS**

**GMTD-709** MCS Seminars (2<sup>nd</sup> Wednesday each month)

**MD/PHD AND DPM/PHD** students will follow the guidelines of the SGPS (IGPBS Specialty Courses) and a course curriculum designed by the Student and Research Committee, with approval by the Dean.

**DEPARTMENT REQUIREMENTS FOR MASTER OF SCIENCE DEGREE**

Master of science programs are tailored to each candidate. The following minimum requirements must be met before the candidate will be eligible for the degree.

**GPHY-522 A, B, & C** Topics in Physiology

**GRADUATE FACULTY**

<p><b>Chair:</b> Janice H. Urban, PhD, Professor                  Neil A. Bradbury, PhD, Professor                  Robert J. Bridges, PhD, Professor                  Eugene L. Dimitrov, MD, PhD, Assistant Professor                  Lisa Ebihara, MD, PhD, Associate Professor                  Richard Hawkins, PhD, Professor                  Donghee Kim, PhD, Professor</p>	<p>Charles E. McCormack, PhD, Professor                  Darryl Peterson, PhD, Professor                  Gordon Pullen, PhD, Assistant Professor                  Hector Rasgado-Flores, PhD, Associate Professor                  Henry Sackin, PhD, Professor and Vice Chair                  Ernest Sukowski, PhD, Associate Professor                  Carl White, PhD, Assistant Professor</p>
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**SECONDARY AND ADJUNCT FACULTY**

Sarah Garber, PhD, Professor  
 Raul Gazmuri, MD, PhD, Professor  
 Timothy Hansen, PhD, Professor  
 Bruce Riser, PhD, Adjunct Professor

*The chair of a department and the Dean may approve faculty and other professional staff members who are not members of the graduate faculty for teaching of appropriate graduate courses.*

**COURSE DESCRIPTIONS**

**GPHY-500 A, B, & C: Medical Physiology**

**Description:** The course offers the basic principles of organ system physiology. Through lectures, demonstrations, conferences, and laboratory work, students receive a quantitative and integrated concept of subcellular, cellular and organ system function.

<b>Credits:</b>	2 Fall, 6 Winter, 6 Spring
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Series Completion
<b>Term(s):</b>	Fall Winter Spring
<b>Instructional Method:</b>	Lecture-Lab
<b>Course Director(s):</b>	Dr. Dimitrov

**GPHY-505:** *Physiology and Biophysics Seminar*

**Description:** Students, staff and invited guests present their current research programs in physiology for discussion and analysis.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Kim

**GPHY-508:** *Writing Skills*

**Description:** This course is designed as a workshop for graduate students to further develop their technical scientific writing skills. The goal of this workshop is to write a short manuscript based on an original dataset provided. The workshop is organized into six sessions over three weeks and includes a mixture of faculty presentations and in-class group writing assignments and discussion.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Summer  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. White

**GPHY-512:** *Physiology of the Autonomic Nervous System*

**Description:** An advanced course with the material covering autonomic nervous regulation and integration of vital functions such as respiration, circulation and temperature regulation.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Sukowski

**GPHY-513:** *Pulmonary Pathophysiology*

**Description:** The biophysics of pulmonary mechanics and gas transport are presented as a basis for evaluating pulmonary function. Modern pulmonary function-testing equipment is utilized in the laboratory, and an emphasis is placed on recognizing abnormal lung volumes and air flows.

**Credits:** 2  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Winter  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. McCormack

**GPHY-514:** *Physiology of the Liver*

**Description:** In addition to an in-depth discussion of the functions of the liver and experimental techniques used in studying the liver, the effects of complete and partial hepatectomy are described as well as the pathophysiology of the liver.

<b>Credits:</b>	2
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Winter
<b>Instructional Method:</b>	Seminar/Discussion
<b>Course Director(s):</b>	Dr. Sukowski

**GPHY-516:** *Cardiovascular Pathophysiology*

**Description:** Clinical aspects of cardiovascular function are emphasized, e.g. heart sounds and murmurs, electrocardiogram, monitoring of central venous pressure, and cardiac function curves.

<b>Credits:</b>	2
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Fall
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. McCormack

**GPHY-522 A, B & C:** *Topics in Physiology*

**Description:** Topics in Physiology provides state-of-the-art knowledge about the physiological basis for understanding numerous pathophysiological situations in humans. The subjects in this course encompass the basic aspects of cell physiology to complex and integrated clinical situations in which normal physiology has been altered.

<b>Credits:</b>	1 Fall 2 Winter 2 Spring
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Series Completion
<b>Term(s):</b>	Fall Winter Spring
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. Rasgado-Flores

**GPHY-534:** *Teaching Methods*

**Description:** To provide graduate students with practical experience in teaching physiology, advanced students present lectures and assist in the planning and direction of laboratory and discussion sessions and in the presentation of technical material under the careful supervision of the staff. Hours and credit hours to be arranged.

<b>Credits:</b>	4
<b>Grading Structure:</b>	P/F
<b>Grade Assigned:</b>	At Series Completion
<b>Term(s):</b>	Fall Winter Spring
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. McCormack

**GPHY-542:** *Electrogenic Ion Pumps*

**Description:** The objective of this course is to conduct an in-depth survey of the current state of knowledge of the mechanisms of electrogenic active transport of ions and of other substrates whose movement is coupled to the movement of a charged substrate. This objective will be achieved primarily by lectures presented by the instructors. In addition, students will be given written homework assignments that will be discussed in class. In general there will be two lecture hours presented per week and one hour of classroom discussion time. Topics to be discussed include: 1) basic principles of pump function, 2) electrogenic properties of ion pumps, 3) ion pumps and electrical properties of cell membranes, 4) bacteriorhodopsin, 5) proton pumps, 6) Na<sup>+</sup>/K<sup>+</sup> ATPase, 7) Ca<sup>++</sup>-ATPase of sarcoplasmic reticulum, 8) FoF<sub>1</sub>-ATPases, and 9) cytochrome oxidase. A written final examination will be given at the end of the course.

<b>Credits:</b>	3
<b>Grading Structure:</b>	ABCF
<b>Grade Assigned:</b>	At Term Completion
<b>Term(s):</b>	Winter
<b>Instructional Method:</b>	Lecture
<b>Course Director(s):</b>	Dr. Rasgado-Flores

**GPHY-599:** *Pre-Candidacy Research Activities*

**Description:** This course is for the PhD student who has chosen a laboratory but not yet passed the Candidacy Exam. Laboratory experience is geared toward learning techniques and obtaining preliminary data toward the student's dissertation proposal and Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GPHY-539)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Ebihara

**GPHY-618:** *Molecular Biophysics of Ion Channels*

**Description:** This course will cover both experimental and theoretical aspects of ionic channels in biological membranes. Topics to be discussed include the following: 1) classical biophysics of the squid giant axon, 2) Na<sup>+</sup> and K<sup>+</sup> channels, 3) calcium channels, 4) K<sup>+</sup> and chloride channels, 5) endplate channels, 6) properties of ions in solution, 7) properties of pores, 8) counting channels, 9) ionic selectivity, 10) ion saturation and binding, 11) mechanisms of drug block, and 12) gating mechanisms.

**Credits:** 3  
**Grading Structure:** ABCF  
**Grade Assigned:** At Term Completion  
**Term(s):** Spring  
**Instructional Method:** Lecture  
**Course Director(s):** Dr. Rasgado-Flores

**GPHY-620:** *Masters Research in Physiology*

**Description:** Research hours performed following submission and approval of a research project by the candidate's Thesis Committee. Hours and units of credit to be arranged.

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Lab Only  
**Course Director(s):** Dr. Ebihara

**GPHY-699:** *Post-Candidacy Doctoral Research Activities*

**Description:** This course is for the PhD student who has successfully passed the Candidacy Exam. May be repeated for credit. Fall, Winter, Spring and Summer Quarters, hours and units to be arranged. (formerly GPHY-535)

**Credits:** 1 - 12  
**Grading Structure:** P/F  
**Grade Assigned:** At Term Completion  
**Term(s):** Fall Winter Spring Summer  
**Instructional Method:** Research  
**Course Director(s):** Dr. Ebihara

**GMTD-711:** *Physiology and Biophysics Journal Club*

**Description:** Presentations on current literature or individual research projects by faculty and students.

**Credits:** 1  
**Grading Structure:** P/F  
**Grade Assigned:** At Series Completion  
**Term(s):** Fall Winter Spring  
**Instructional Method:** Seminar/Discussion  
**Course Director(s):** Dr. Sukowski