

**Integrative  
Physiology and  
Pharmacology  
Handbook**

**2016-  
2017**

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## Graduate Program Overview

A graduate degree in Integrative Physiology and Pharmacology is advantageous for employment environments in which familiarity with multiple organ systems is important:

- academic research institutions
- the pharmaceutical industry
- academic teaching institutions, including undergraduate education as well as professional schools (medical, dental and veterinary, pharmacy, and allied health professions (nursing, physical and occupational therapy, physician's assistant programs)
- government regulatory agencies (e.g., EPA, FDA, CDC)

The IPP program is designed to train students in a variety of modern methodologies and to prepare them to use whatever conceptual and technological approaches are most appropriate for pursuing promising new areas of research. This takes place within a collegial environment in which each investigator has multiple ongoing collaborations and a given project typically involves the complementary expertise of multiple participants.

The **average time to completion** of the IPP Ph.D. degree (over the past 10 years) is 5.1 years. Upon completion of the IPP degree, the following competencies will have been mastered:

- broad knowledge base in Physiology and Pharmacology
- multiple research techniques
- experimental design and statistical analyses
- responsible conduct of research, ethics and professionalism
- scientific communications skills (poster and oral presentations)
- scientific writing skills (abstracts, manuscripts and grant proposals)
- critical evaluation of scientific thought.

### The structure of the IPP program:

The IPP track trains both M.S. in Biomedical Sciences students with an emphasis on Integrative Physiology and Pharmacology, as well as Ph.D. students in Integrative Physiology and Pharmacology. The IPP track is governed by an Executive Committee comprised of the chairs of the Admissions and Recruitment Committee, the Curriculum Committee and the Student Progress Committee, plus the Program Director and two other at-large faculty members.

- The Program Director (elected by the Executive Committee) serves as the program administrator, the Chair of the IPP Executive Committee, the advisor of the M.S. and Ph.D. matriculants as they enter the program in year-1 and is responsible for all day-to-day management as well as long-term program planning for the IPP program.
- The Admissions Committee evaluates applications and accepts students into the Ph.D. or M.S. program
- The Curriculum Committee determines the Core course requirements, designs and approves course modifications to be presented to the Graduate Council, assigns course directors, develops and administers the IPP Final Examination and evaluates and approves individual student requests for curriculum modifications.
- The Student Progress Committee monitors progress of the students throughout their entire program, evaluating their progress in coursework and laboratory performance. This committee reviews students' progress toward completing required Milestones (see below), including ensuring that doctoral candidates are making adequate progress toward completion of their dissertation research.

- The faculty of the IPP Program are members of the Graduate Faculty, drawn from basic science and clinical departments at WFU and the Wake Forest School of Medicine, approved by the WFU Graduate Council and subsequently approved by the Executive Committee as members of the IPP program for their roles in teaching, internship coordination and student research advising.

## **Administrative Policies & Procedures of the IPP Program**

### **IPP Program Director**

The IPP Director has three primary areas of responsibility:

- ...to the students enrolled in the IPP Program—to enhance and integrate their educational experience, research training, professional development and career opportunities.
- ... to the IPP faculty—to balance their teaching responsibilities, facilitate students' entry into their programs and laboratories and provide an innovative, integrative approach to graduate education, research, and career development.
- ...to all Graduate School programs—to coordinate IPP activities to serve the Graduate School's overall mission of attracting the best prepared, most highly-motivated students and educating them to be tomorrow's leaders in science, education and service.

**IPP Director Selection:** The Director will be elected by the Executive Committee, in consultation with the appropriate Departmental Chair, from nominations received from the IPP faculty members. Nominees will be members of the graduate faculty at the rank of Associate Professor or above. The name of the selected Director will be sent to the Graduate School Dean who will appoint the Director following evaluation of appropriate credentials and consultation with the relevant Department Chair. Salary support commensurate with the Director's responsibilities will be provided by the WFU Graduate School of Arts and Sciences.

**Graduate Student Recruitment and Admissions:** The Director will work with the Recruitment and Admissions Committee to develop strategies that will attract a diverse group of applicants who are strongly committed to developing a successful research career. The Director and Admissions Committee will develop admissions criteria that emphasize research experience, academic background and maturity while also considering quantitative elements (GPA, GRE) as well as the match between the applicant's research interests and the strengths of the faculty within the IPP program.

**Advising and Mentoring Graduate Students:** The Director will take the lead in developing a comprehensive evaluation process and work with the Student Progress Committee in refining this process as well as applying it so as to measure and track the progress of each of our students, from recruiting through their graduate training and career paths. These metrics will enable refinement of the IPP program and strengthen the development of extramural training grant applications.

The Director will serve as the 1<sup>st</sup> year academic advisor for each of the students entering the IPP program each fall. The Director will meet early on with each new student to guide his or her selection of research rotations, then on a monthly basis to track progress in their courses. The Director and the Student Progress Committee will have a special responsibility to identify students needing assistance in adjusting to the pace and challenges of the WFU Graduate School. In the spring term, the IPP Director will work closely with each student and research rotation mentors to match the research laboratory best suited to the student's strengths and interests.

**Liaison to WFU Graduate Programs:** The Director will coordinate the activities within the IPP Program as well as with the other WFU Graduate School programs, subject to the Graduate School Bylaws and approval of the Dean of the Graduate School. New programs may be proposed following the Graduate School's normal procedures and included within IPP, subject to the approval of the IPP Executive Committee and the Graduate School.

**IPP Administrative Assistant:** The Director will work closely with the IPP Administrative Assistant who will coordinate admissions and related tasks, and keep electronic records of each student's progress.

**Curriculum Development:** The Director and the Curriculum Committee will work together to define optimize core courses and electives. In consultation with the faculty and Department Chairs, the Director and the Curriculum Committee will select course directors, define their responsibilities and ensure that they have the resources needed to develop and teach the common courses within IPP. Course evaluation forms will be completed by all students enrolled in the courses and submitted anonymously to the Director and the Curriculum Committee. The Director together with the Curriculum Committee will evaluate each course on a yearly basis, and recommend improvements based on student and faculty input.

### **The Admissions Committee**

The Admissions Committee will consist of IPP faculty members who have experience in training Ph.D. students, plus the Director. The membership of the Admissions Committee will be proposed by the Chair and the Director, and approved by the IPP Executive Committee. Typically, the membership will be drawn from multiple disciplines or departments that contribute to the teaching within IPP. The Chair(s) will serve as a member of the IPP Executive Committee.

The functions of the Admissions Committee include:

1. reviewing materials submitted by applicants to the IPP Ph.D, M.S. and M.D./Ph.D. programs. Although the priorities are generally set by the Chair of the Admissions Committee, the most important criteria for predicting success in the IPP Program are research experience, academic background and overall maturity. The Committee will also consider GRE and/or MCAT scores, the applicant's personal statement, letters of recommendation and any other materials that are submitted. The Committee typically begins reviewing applications in November and selects individuals to travel to Wake Forest for interviews by mid-January.
2. organizing the events surrounding the interview weekend, which is typically held in February.
3. following the interviews, deciding the order of priority for the applicants to receive offers of matriculation for the upcoming fall term, and communicating these decisions to the Director and the Graduate School, who formally makes the offers.

### **The Curriculum Committee**

The Curriculum Committee will consist of IPP faculty members who have experience in teaching courses or training Ph.D. students, plus the Director. The membership of the Curriculum Committee will be proposed by the Chair and the Director, and approved by the IPP Executive Committee. Typically, the membership will be drawn from multiple disciplines or departments that contribute to the teaching within IPP. The Chair(s) will serve as a member of the IPP Executive Committee.

The functions of the Curriculum Committee include:

1. Periodically evaluate the course offerings by the IPP program and submit any changes to the Graduate School. Upon approval by the Graduate Council, the Curriculum Committee will advise the Director, such that changes can be made on the IPP website.
2. Identify which courses will be taught in the fall, spring and summer semesters of each academic year. Ensure that course directors are available for each of the courses. Notify the Graduate School that these courses will be taught, and in which semester.

For each course, the Course Director will be responsible for the content of the course, the implementation of the course, assembly of the teaching faculty, preparation of the homework or examinations for the course, this information will be provided to the students on the first day of class, usually by preparation of a Syllabus. The Course Director should provide the Syllabus to the Administrative Assistant on the IPP website. The Course Director will submit the grades for all students to the Graduate School (usually by PeopleSoft), and report the grades of the IPP students to the IPP Director and the Chair of the IPP Student Progress Committee.

3. Determine the core academic requirements for the students in the IPP curriculum. If circumstances require any changes, provide a plan of action to be submitted to the IPP Executive Committee for approval. The Curriculum Committee will consider the special circumstances of students matriculating in IPP who are medical residents or postdoctoral fellows with a medical degree and may permit their previous course work in medical school to be used in place of electives.
4. Maintain a file of questions for the IPP Final Examination. Solicit new questions for the file annually from the Course Directors of the core courses. Provide guidelines to the faculty for the development of questions for the IPP Final Examination.
5. Administer the IPP Final Examination, and return the student responses to the IPP faculty member who developed each question. Provide guidelines for the grading of the questions (e.g., score based upon 100 points, make notations on the copy for the student's file). Collect the graded responses, and report each student's total points to the Director and the Chair of the Student Progress Committee.

### **The Student Progress Committee**

The Student Progress Committee will consist of IPP training faculty members who have had experience in training Ph.D. students. The Chair will serve as a member of the IPP Executive Committee.

The functions of the Student Progress Committee include:

1. Evaluate progress of year-1 and year-2 students until they have assembled a Dissertation Committee, at which time the Dissertation Committee will assume responsibility for the student's progress. Evaluation will involve reviewing student research rotation reports from the mentors each semester, examining transcripts of students after each semester, and meeting with individual students who receive C grades or poor research reports. A course of action will be recommended for each individual student who has not met expectations. Documentation of the advice of the Student Progress Committee will be submitted to the student's file by the Chair.

2. Serve as an advisory committee for students who are having difficulties in their academic progress at any stage of their training. Students who are in academic difficulty, have a problem in the laboratory, such as concerns with their advisor, laboratory personnel, their dissertation committee, or other situations that require advocacy, can request an unbiased evaluation of the situation by the Track Director or the Chair of the Student Progress Committee in complete confidentiality. The Student Progress Committee will hear the student's concerns and recommend a course of action for the student. Documentation of the advice of the Student Progress Committee will be submitted to the student's file by the Chair.
3. Document the progress of each student in the IPP Final Examination and the Preliminary Research Proposal required for Advancement to Candidacy. The Student Progress Committee will notify each student upon their successful completion of the Comprehensive Examination, and advise them of the time-frame for the assembly of their Dissertation Committee and writing and defense of their Preliminary Research Proposal. The Student Progress Committee will be notified by the student's Dissertation Committee upon successful completion of the Preliminary Research Proposal.

In the event of a student's unsuccessful completion of the IPP Final Examination, the Student Progress Committee will meet with the student to determine any extenuating circumstances. The Student Progress Committee will evaluate the student's situation and may advise a plan of action for the student. The plan could provide for a course of remediation, which may involve a course of study in preparation for a retake of the unsuccessful component(s) of the examination. Documentation of the advice of the Student Progress Committee will be submitted to the student's file by the Chair.

4. Serve as the nomination committee for recommending IPP students who are eligible for the various graduate school awards when necessary. Such awards include the annual Melson Award for graduating students. Documentation of the nomination by the Student Progress Committee will be submitted to the student's file by the Chair.

## IPP Program Leadership, 2016-2017

Program Director:

Paul Czoty, Ph.D.  
[pczoty@wakehealth.edu](mailto:pczoty@wakehealth.edu)  
336-713-7112

Program Administrator:

Denise G. Wolfe  
[dewolfe@wakehealth.edu](mailto:dewolfe@wakehealth.edu)  
336-713-1520

Executive Committee:

Paul Czoty, Ph.D., Chair  
Allyn Howlett, Ph.D.  
Jasmina Varagic, Ph.D.  
Ann Tallant, Ph.D.  
Hossam Shaltout, Ph.D.  
Jeff Martin, Ph.D.  
Steve Childers, Ph.D.  
Peg Gallagher, Ph.D.

Admissions Committee:

Jasmina Varagic, Ph.D., Chair  
Paul Czoty, Ph.D.  
Tracy Criswell, Ph.D.  
Liliya Yamaleyeva, Ph.D.  
Ann Tallant, Ph.D.  
Allyn Howlett, Ph.D.  
Mark Ferris, Ph.D.  
David Caudell, D.V.M.  
Jeff Willey, Ph.D.

Curriculum Committee

Ann Tallant, Ph.D., co-Chair  
Hossam Shaltout, Ph.D., co-Chair  
Paul Czoty, Ph.D.  
Allyn Howlett, Ph.D.  
Rong Chen, Ph.D.  
Carol Shively, Ph.D.  
Graca Almeida-Porta, Ph.D.  
Victor Pulgar, Ph.D.  
Tom Smith, Ph.D.  
Mark Chappell, Ph.D.

Student Progress Committee:

Jeff Martin, Ph.D., Chair  
Charles Eldridge, Ph.D.  
Kylie Kavanaugh, D.V.M.  
Michael Nader, Ph.D.



## Academic Overview – Ph.D. Program

This section presents a brief overview of the typical course of study for a Ph.D. student in the IPP Program. It should be emphasized that deviations from this specific progression are possible after review by the Curriculum Committee. Progress through the curriculum is monitored through the use of Benchmarks and Milestones as described in the next section.

### Year 1

**Core courses:** Analytical Skills (MCB 700); Physiological Techniques (IPP 715); Principles of Pharmacology (IPP 701); Molecular & Cellular Biosciences (MCB 701); Systems Physiology & Pharmacology (IPP 702)

### **Research design, professionalism and communications competencies:**

- Student Seminar – IPP 703/704 (each student receives feedback each year on his/her research presentation)
- Journal Club – IPP 705/706 (each student presents one or more research articles to a journal club of his/her choice, and attends professional research seminars in the research area of his/her choice)
- Scientific Integrity – Grad 715) a year-long course on responsible conduct of research administered by the Graduate School for all students
- Professional Development – Grad 715) a course administered by the Graduate School which introduces them to multiple career options

**IPP Final Examination:** At the end of Year 1, students undertake the IPP Final Examination, which challenges students to integrate knowledge gained in the core courses.

**Research skills:** Ph.D. students participate in research rotations in two or three different laboratories (Fall, Spring, Summer). Each rotation is followed by an evaluation conducted with the research advisor. A written evaluation form, signed by both student and rotation advisor, is submitted to the Student Progress Committee and the Dean of the Graduate School. Research credit each semester (Satisfactory/Unsatisfactory) is based upon an oral and written evaluation, signed by both student and advisor, submitted to the Director and the Student Progress Committee and forwarded to the Dean of the Graduate School.

**Research Laboratory and Advisor:** At the end of Year-1, the Ph.D. student selects a research advisor from among the rotation experiences, to begin a dissertation project in year-2.

### Year 2

**Core courses:** Quantitative Methods (IPP 741)

**Two electives** chosen by the student in consultation with his/her advisor. These may be offered by any academic program of the medical school or Wake Forest University, subject to approval by the Curriculum Committee. Students are encouraged to take additional electives following discussion with their advisors.

**Journal Club, Seminar** (IPP 703/704 and IPP 705/706)

**Individual Development Plan:** In Year 2, students complete the Individual Development Plan self-evaluation assessments from the AAAS Science Careers website and to read through the accompanying informational materials. Students self-identify general career directions, and are

asked to begin participating in extracurricular activities that can help them determine if this direction is right for them. These self-evaluations are discussed as a cohort with the Director and Student Progress Committee.

**Research:** By the end of Year 2, the student and advisor identify a dissertation project, and together select a Dissertation Committee having expertise in diverse research aspects of the project. A first Committee meeting is held to apprise the Dissertation Committee of the nature of the proposed project and obtain their advice. A Chair of the Dissertation Committee is selected from outside the student's research department. The student then prepares a written Dissertation Proposal in the style of an application for predoctoral extramural funding relevant to the student's research (e.g., NIH NRSA or American Heart Association grant) to be evaluated and approved by the Advisor and the Dissertation Committee. Within three weeks of approval of the written document, the student undergoes an oral defense of the proposal, during which the Dissertation Committee assesses the ability of the student's knowledge of all aspects of the proposed project. In particular, the Dissertation Committee will assess the student's understanding of the rationale, experimental design, hypotheses and alternative interpretations and contingencies. The student will also be evaluated regarding knowledge of statistical analysis of the proposed project. Following the proposal defense, the Dissertation Committee Chair advises the IPP Director and Dean of the Graduate School of the successful completion of the proposal, and, assuming all other milestones are completed, the student is Advanced to Candidacy.

In the event that the Dissertation Committee does not recommend successful passing of the Preliminary Proposal Defense, the Student Progress Committee will meet with the student and make a recommendation regarding either remediation or alternative program planning.

#### Year 3 and beyond

The majority of a student's time in Year 3 and beyond is spent working toward completion of dissertation research. Students continue to participate in Journal Club and Seminar courses (IPP 703/704 and IPP 705/706) until they graduate. Students are encouraged to meet with their dissertation committees every 6-9 months. It is advisable to hold one of these meetings after the student's seminar.

**Individual Funding Grant Submissions:** Students submit their Dissertation Proposal to the appropriate funding agency.

**Professional Development:** Each student may engage a professional development mentor who is experientially able to assist him/her along an individual development pathway. In addition, professional development GRAD courses for credit can be taken, such as College Level Teaching (experience at local institutions); Internship Opportunities (local industry or institutional research administration); or Technology Assessment (research innovation, intellectual property protection, and commercialization).

#### Program completion

**Written Dissertation:** The Dissertation is comprised of a thorough Introduction to the field, a compendium of the student's publications, submitted manuscripts, or manuscripts in preparation for submission, followed by a thorough Discussion section that analyzes the contributions of these studies to the field. The IPP Executive Committee expects that the student will have completed a minimum of two first-author manuscripts or publications for completion of the degree. The Dissertation Committee critically evaluates content, makes recommendations for improvement, and ultimately approves the written document. The document is also submitted to

the Graduate School for approval of form and format. Per Graduate School rules, the written document must be submitted to the Graduate School and to the Dissertation Committee four and three weeks, respectively, prior to the Dissertation Defense.

**Dissertation Defense:** Ten days prior to the scheduled public defense, the chair of the thesis committee polls the committee members to determine whether the thesis is defensible. The results of this polling are reported to the student and the graduate mentor. After the written document has been approved by the Dissertation Committee, the student gives a public seminar highlighting the research data and its importance to the field. This is followed by a private defense with the Dissertation Committee. The Dissertation Committee makes the recommendation to the Dean of the Graduate School that the student has passed his/her Dissertation Defense and that all requirements toward the Ph.D. degree have been completed. In the event that the Dissertation Committee does not recommend passing, the Dissertation Committee will provide guidelines to the student specifying how or whether the student can prepare a passable written document or remediate the failed defense.

## Benchmarks & Milestones – Ph.D. Program

<u>Course/activity</u>	<u>milestone</u>
<u>First Year, fall semester</u>	
MCB 700: Analytical Skills	final grade of B or better
MCB 701: Molecular & Cellular Biosciences	final grade of B or better
• exams	
IPP 701: Principles of Pharmacology	final grade of B or better
• exams	
IPP 703: Student Seminar	final grade of B or better
• review paper	
IPP 705: Journal Club	final grade of B or better
IPP 715: Physiological Techniques	satisfactory
IPP 797: Research rotation	satisfactory evaluation
GRAD 713: Scientific Integrity	satisfactory
<u>First Year, spring semester</u>	
IPP 702: Systems Physiology & Pharmacology	final grade of B or better
• exams	
IPP 704: Student Seminar	satisfactory
• student presentation	
IPP 706: Journal Club	final grade of B or better
IPP 798: Research rotation	satisfactory evaluation
GRAD 701: Intro. to Professional Development	final grade of B or better
GRAD 714: Scientific Integrity	satisfactory
IPP Final Exam	pass (70%) all questions
<u>First Year, summer</u>	
IPP 797: Research (rotation)	Satisfactory evaluation
First year GPA	overall GPA > 2.5
<u>Second Year, fall semester</u>	
Elective course	final grade of B or better
IPP 703: Student Seminar	satisfactory
• student presentation	
IPP 705: Journal Club	final grade of B or better
IPP 741: Quantitative Methods	final grade of B or better
• exams	
IPP 797: Research	Satisfactory evaluation
<u>Second Year, spring semester</u>	
Elective course	final grade of B or better
IPP 704: Student Seminar	satisfactory
• student presentation	
IPP 706: Journal Club	final grade of B or better
IPP 798: Research	Satisfactory evaluation
<u>Second Year, summer</u>	
Research	Satisfactory evaluation
GPA	overall GPA > 2.5
Proposal Defense	pass
IDP	approved

***Completion of all milestones is required for advancement to Candidacy***

## Academic Overview – M.S. program

This section presents a brief overview of the typical course of study for a M.S. student in the IPP Program. It should be emphasized that deviations from this specific progression are possible after review by the Curriculum Committee. Progress through the curriculum is monitored through the use of Benchmarks and Milestones as described above, although not all Milestones required for Ph.D. students are required of M.S. students.

The **Master of Science in Biomedical Science** degree is a full-time, graduate degree option that is designed to help students with a bachelor's degree, preferably with a major in the sciences, improve their academic foundation in the biomedical sciences and augment their credentials for admission into health professional programs and Ph.D. study in the sciences or entrance to the workforce. Students may select either a thesis or non-thesis option.

### Thesis MS Requirements

- a minimum of 24 course credit hours, including core courses as identified by the IPP Curriculum Committee, plus 6 hours of research
- successfully completing an original investigation, which while limited in scope, is of publishable quality
- acceptance of a written thesis by an advisory committee composed of the student's advisor and two additional graduate faculty members
- Students are required to have an overall GPA of 2.5 to be in good standing and an overall GPA of 3.0 in order to advance to candidacy and graduate. An advisory committee will determine when the student can apply for candidacy. A student is admitted to candidacy by the dean of the Graduate School. Acceptance of the written thesis requires the approval of an advisory committee composed of the advisor and two additional faculty members.

### Non-Thesis MS Requirements

Students must fulfill one of two options for non-thesis option. No final examination is required.

- MS Degree with Internship: Complete a minimum of 24 course credit hours and an internship under an advisor consisting of 4-6 hours of research and a written document that summarizes the research. This document will be evaluated by the advisor, the IPP Director, and one other faculty member.
- MS Degree without thesis or project: Take additional course work in the second year as a part time student to provide preparation or more advanced exposure to specialized areas of biomedical research. The additional course work will have to be completed within a year. Students are required to complete 36 hours for graduation.

### Curriculum

All students take a minimum of 30-36 semester hour credits in the basic sciences. Courses are selected from the core courses and electives including: biochemistry, molecular cell biology, neuroscience, biomedical engineering, genetics, human physiology, microbiology, immunology, pharmacology, scientific professionalism and the responsible conduct of research. A special capstone experience is available to students through the Wake Forest Certificate in Science Management program. Elective credits, offered in a variety of disciplines, include other biomedical science courses. These electives improve critical thinking skills, study skills, and enhance the student's preparation for professional school application. The faculty of the program are graduate faculty from Integrative Physiology and Pharmacology. The IPP has a recommended core curriculum. Non-thesis students will select additional courses from the

approved curricula or electives through the Graduate School or other Wake Forest University graduate units, such as the Schools of Business.

## Benchmarks & Milestones – M.S. Program

<u>Course/activity</u>	<u>milestone</u>
<u>First Year, fall semester</u>	
MCB 700: Analytical Techniques (optional)	final grade of B or better
MCB 701: Molecular & Cellular Biosciences ...or BICM 704: Preparatory Biochemistry	
• exams	
IPP 701: Principles of Pharmacology	final grade of B or better
• exams	
IPP 703: Student Seminar	final grade of B or better
• review paper	
IPP 705: Journal Club	final grade of B or better
IPP 715: Physiological Techniques	satisfactory
GRAD 713: Scientific Integrity	satisfactory
<u>First Year, spring semester</u>	
IPP 702: Systems Physiology & Pharmacology	final grade of B or better
• exams	
IPP 704: Student Seminar	satisfactory
• student presentation	
IPP 706: Journal Club	final grade of B or better
GRAD 701: Intro. to Professional Development	final grade of B or better
GRAD 714: Scientific Integrity	satisfactory
IPP Final Exam	pass (70%) all questions
<u>First Year, summer</u>	
First year GPA	overall GPA > 2.5
<u>Second Year, fall semester</u>	
Elective course	final grade of B or better
IPP 703: Student Seminar	satisfactory
• student presentation	
IPP 705: Journal Club	final grade of B or better
IPP 741: Quantitative Methods	final grade of B or better
• exams	
<u>Second Year, spring semester</u>	
Elective course	final grade of B or better
IPP 704: Student Seminar	satisfactory
• student presentation	
IPP 706: Journal Club	final grade of B or better
<u>Second Year, summer</u>	
GPA	overall GPA > 2.5

*Note: This is intended as an example schedule for a non-thesis MS student (without thesis or project). Students with a thesis/project would also earn research credits, and may take fewer electives. For all students, individualized attention is given during upon arrival at Wake Forest, and a good deal of flexibility is allowed in consultation with the IPP Program leadership.*

## IPP Program: Policy on Satisfactory Progress

Established standards of performance and behavior in each course and laboratory activity are essential components of a quality education. Progress towards completion of the Ph.D. or M.S. degree is based on demonstration of academic performance and professional behavior that meets or exceeds the standards described in the following paragraphs. Students must demonstrate, to the satisfaction of the IPP faculty, that they are fit, both academically and professionally, to be a graduate of the IPP Program. The method by which a student demonstrates progress to the IPP faculty involves timely completion of a series of Benchmarks and Milestones. In addition to the defined Milestones and Benchmarks, it is assumed that students maintain the highest standards of ethical and professional behavior at all times.

1. **Benchmarks**: The IPP Program uses a number of Benchmarks to assess progress within a course. Benchmarks are tests/assignments/evaluations within a course that have been identified by the IPP Executive Committee, Curriculum Committee and/or Course Directors as essential measures of satisfactory progress in that course. Benchmarks offer an opportunity to identify a student's areas of difficulty early in a course so that any deficiency can be remediated. Failure to meet a benchmark triggers the following:

Failure of 1 Benchmark: Student must meet with the Course Director to identify learning issues for remediation of the Benchmark.

Failure of 2 Benchmarks: Student must meet with the Course Director and the IPP Program Director for directed support regarding remediation of the Benchmark.

Failure of any subsequent Benchmarks will result in a review with IPP Program Director and referral to the IPP Student Progress Committee (SPC; see below).

2. **Milestones**: Milestones are foundational educational experiences that must be accomplished in a timely manner in order to proceed in the curriculum. Final course grades and assessments of performance in research rotations or in a resident laboratory are used as Milestones in the IPP curriculum. Students must pass all Milestones to complete the IPP program. Students who fail a Milestone must demonstrate successful remediation of that Milestone before proceeding in the IPP program.

Failure to meet any Milestone will result in review of the student's performance by the Student Progress Committee (SPC) for consideration of a change in the student's standing in the program, as described below. In the event a student is permitted to continue in the IPP program following a review by SPC, the student must successfully demonstrate remediation to competency before proceeding in the IPP program. Students who require remediation to competency for a failed Milestone are not eligible for a grade higher than 'Pass' or 'B' in that Milestone.

The Student Progress Committee (SPC) is a standing committee within the IPP Program with membership drawn from faculty. Members serve overlapping terms to provide continuity among the committee. The SPC is charged with (1) reviewing and approving the continuation of students in the curriculum, (2) reviewing and approving students for graduation and (3) reviewing and making decisions regarding students with unsatisfactory academic performance or professional behavior. Meetings, minutes and decisions of the SPC are considered confidential.

The IPP Program Director will, at least semiannually, present to the SPC a list of students for a determination regarding eligibility for continuation in the curriculum and/or graduation. When



necessary, the IPP Director will refer a student to the SPC regarding a change in status. Reasons for such a referral to the SPC include failure to accomplish a Milestone or multiple Benchmarks in a timely manner, occurrence of unethical or unprofessional behavior, failure to pass remediation of the IPP Final Exam and/or failure to maintain an overall GPA of 3.0. In each case, the IPP Director will provide to the SPC any and all available information regarding the student's past, present and pending academic and/or professionalism issues. The SPC may also obtain additional information from others that it may deem relevant to its review of the concern(s), including but not limited to, opinions of course directors and laboratory rotation advisors and the student's dissertation advisor. The SPC will decide what information is relevant to the case at hand. The IPP Director is not a member of the SPC and will not be present during any deliberation; however, the SPC may, at its discretion, consult the IPP Director during deliberations. The student will retain the right to appear before the committee, and will be invited to do so and to present relevant information on his or her own behalf. Students may elect not to appear, but submit a written statement prior to the SPC meeting when their case will be reviewed. While the student whose performance is being reviewed may have advisors, legal counsel and other individuals available to lend support throughout the process, only the student will be permitted to meet with the SPC.

Following review of any concern referred to the SPC, the SPC will select an outcome or outcomes from the following options:

*...if the student is in good standing*

Student remains in good standing or is placed on Warning

*...if the student is on Warning*

Student remains on Warning or is placed on Probation

*...if the student is on Probation*

Student remains on Probation or is recommended for dismissal

### **Warning**

A student may be placed on Warning by the SPC or by the IPP Director (or his/her designee) without referral to the SPC. This typically occurs when a student in Good Standing fails to complete a Milestone. A student who is placed on Warning will remain on Warning for a period of twelve (12) months. However, the SPC will review the academic/professional performance of the student 6 months into the Warning period to determine whether the student's performance supports an early termination of Warning status. The student may request to appear before the SPC to present a case that placement on Warning is inappropriate, for any reason.

### **Probation**

A student cannot be placed on probation without review by the SPC, which includes a meeting with the student. A student who is placed on Probation will remain on Probation for a period of 24 months. However, the SPC will review the academic/professional performance of the student 12 months into the probationary period to determine whether the student's performance supports an early termination of Probation.

### **Recommendation for Dismissal**

Dismissal from the IPP Program and Graduate School is an undesirable outcome that all parties should work diligently to avoid. If failure of a Milestone or breach of professional behavior results in a student already on Probation to be brought before the SPC, the SPC may recommend that the Dean of the Graduate School dismiss that student from the Program and/or Graduate

School. Note that the ultimate action is the decision of the Dean alone; a student cannot be dismissed from the IPP Program or Graduate School by the IPP Director or the SPC.

**Other potential recommendations**

Other alternatives, such as tutoring, community service, counseling or a leave of absence may be deemed appropriate by the SPC. In extreme cases, the SPC retains the right to skip a step in this process, e.g. recommend that a student in good standing be dismissed.

The decisions of the SPC will be recorded in the minutes of each meeting and transmitted to the IPP Director and, in some cases, the Dean of the Graduate School. All written communication with and notifications to students regarding the SPC's review and decision will be conveyed to the student within 2 business days by the IPP Director (or his/her designee) via the student's Wake Forest e-mail account. Students permitted to continue in the curriculum will do so with the understanding that any concerns regarding the student's academic performance or professionalism will require an additional review by the SPC.

## **Integrative Physiology and Pharmacology Graduate Program Annual Report, 2015-2016**

The Integrative Physiology and Pharmacology program trains MS and PhD students in a broad range of research areas and methodologies, ranging from molecular to human studies. During the 2015-16 academic year the program trained 23 PhD and 4 MS students. 5 students earned their PhD and 4 earned the MS degree during this academic year. IPP students published over 30 papers in high-quality, peer-reviewed journals during this academic year. The students co-authored over 25 abstracts to professional society meetings and presented their work as posters or oral presentations. IPP students were supported by: the US Army (1), NIH T32 training grants (6), American Heart Association predoctoral fellowships (2) and the Bright Focus Foundation (1), with others being supported by the graduate school (1<sup>st</sup> year students) and by their participation in R01 and other grants from their research advisors. As of July 1, many students are awaiting word regarding submitted applications for NIH NRSA and foundation-based funding. Students received numerous awards over the past year, including 16 travel awards to scientific meetings of professional societies. In addition, IPP students were the winner (Marnie Silverstein) and runner-up (Meijian Guan) of the Three-Minute Thesis competition at this year's WFU Graduate Student and Postdoc Research Day. Another notable award was that Bradley Keegan's entry into the Neuro Start-Up Challenge (sponsored by NIH's Center for Advancing Innovation and the Heritage Provider Network) placed 4<sup>th</sup> of 75 teams, earning Bradley and his co-investigators funds to pursue a small start-up company.

Workforce development is an important aspect of the IPP program. 12 IPP students participated in organized teacher-training activities either as lecturers or tutors, serving WFU graduate, undergraduate and PREP students, as well as students at Winston-Salem State and Salem College. Students took advantage of a number of other career training opportunities as well, including the NIEHS Biomedical Career Symposium, a Short Course on Statistical Genetics and Genomics at UAB and WFU Workshops on teaching, service learning and mentorship. One student was a Technology Transfer intern with Wake Forest Innovations. Another spent time at the Oroboros Mitofit Lab in Innsbruck, Austria as a visiting scientist and attended the Oroboros Oxygraphs 2k training program. A Masters student completed internships at the NC Academy of Sciences, Salzberg Therapeutics and the WFU IRB.

Service is also an important component of membership in the IPP Program. Within the Graduate School, IPP students have been involved in activities including recruitment, orientation, the MMARS (Matching Matriculates and Return Students) program, the Honor Council and the Graduate Student Association, in which IPP students were co-Chair and past-Chair. One student served as the editor of the Neurotransmitter. IPP students were also very active in the Brain Awareness Council. Extramural volunteer activities have included educational and public information activities such as Kernersville Cares for Kids, the SciTech summer program, Life Science Research Weekend at the Seattle Pacific Science Center, the Girl Scouts' 'Mad Science' event, the "Share the Health" fair, the 2016 NC DNA Day, the National Youth Leadership Forum and visits to local high schools, middle schools and elementary schools. Others were active in their communities and churches, participating in various charity events including volunteering at the Whiskers and Wine rabies clinic, as a volunteer veterinarian for the Animal Adoption and Rescue Foundation as well as the Junior League in Winston-Salem and Kids in the Kitchen which promotes healthy eating in children.

Spring 2016 was a time of transition for the leadership of the IPP Program. Dr. Allyn Howlett stepped down as Director to assume a position as Assistant Dean of the Graduate School. The directorship passed to Dr. Paul Czoty on an interim basis for the remainder of the academic year. As of July 1, 2016, he has assumed the Director's role. In addition, the Chairpersons of

the major IPP Committees have changed. Dr. Jasmina Varagic succeeded Drs. Czoty and Peg Gallagher as Chair of the Admissions Committee. Dr. Hossam Shaltout joined Dr. Ann Tallant (current Chair) as a co-Chair of the Curriculum Committee. Finally, Dr. Jeff Martin assumed the leadership of the Student Progress Committee from Dr. Mark Chappell. Because all these individuals have served the IPP Program for many years, there is great confidence that the Program and its various committees are in good hands. New additions to the membership of the various committees, and to the IPP faculty, will provide fresh perspectives.

With new leadership will come a review and updating of many of the policies and procedures of the IPP Program, as well as several new initiatives designed to enhance the quality of our students' experience as a whole. Fortunately, the strengths of the IPP Program in terms of its areas of teaching contribution and basic science research align perfectly with the domains emphasized in the Wake Forest School of Medicine Strategic Plan. In particular, the Wake Forest Institute for Regenerative Medicine and the Hypertension & Vascular Research Center have for several years been two of the three pillars of strength in the IPP Program. The third major area of strength, substance abuse, has this year also come in line with institutional priorities with the establishment of the institutional Center focusing on substance abuse. Beyond these three areas, several IPP faculty and students have been working in cancer, diabetes and aging.

The **strengths** of the IPP program include the comprehensive training program in both physiology and pharmacology and commitment to training students for diverse career paths in industry, academia, and beyond. We have implemented an approach to training that features individualized curriculum development. Course requirements are limited, with the majority of the curriculum consisting of numerous electives that match the student's research interest. This ability to customize electives, journal clubs and other opportunities has proven very popular and effective. Quality control is assured by the inclusion of an "IPP Final Examination" at the end of the first year which covers materials in the introductory classes (IPP 701, IPP 702).

Note that this "IPP Final Examination" replaces the program's long-standing Comprehensive Examination which took place at the end of the second year, prior to Advancement to Candidacy. The IPP Program was the only graduate program to have such a comprehensive (or "qualifying") exam. The faculty of the IPP Program felt it was a necessary tool for determining whether a student could integrate didactic material in a manner befitting a Ph.D. candidate. Nonetheless, there were many undesirable effects of holding the exam at that point in a student's career; for example, the ominous nature of an all-important exam caused undue stress and distracted students from laboratory work. After a great deal of introspection and discussion, the IPP Executive Committee voted to transition to this new "Final Exam" model, which retains the ability to evaluate students' ability to think in an integrated manner, eliminates some of the negative consequences and carries with it other benefits associated with the move to the end of the first year.

We have a breadth of potential mentors/topics of research, and our faculty members have strong teaching and mentoring experience and enthusiasm for graduate education. Our students receive individualized attention (no "factory" laboratories) in research areas relevant to public health needs. Because of our diverse biomedical research, we are well-positioned to grow in many of the research initiatives of the institution. The increasing demand from pharmaceutical/biotech companies for scientists well trained in the fundamentals of systems physiology and pharmacology is an opportunity, as more development is occurring in smaller companies. Thus, our cross-disciplinary collaborations can lead to workforce development opportunities.

The IPP program has great **opportunities** for students to take their degree into a wide variety of employment niches. We have been making efforts to assess student career development plans early in each student's program, and then foster the interests of the students so that they can participate in workforce development activities outside the classroom or the laboratory. We would like to build our relationships with community and private sector entities to expand internship activities and perhaps find funding for student support via organizations outside of the NIH sources. An exciting opportunity for the IPP Program itself is its alignment with the new institutional Center based on substance abuse and addiction, which launched July 1, 2016. Substance abuse research has long been a major strength of IPP faculty. The resources associated with the institutional center will invigorate our research programs which will undoubtedly have a positive impact on graduate education.

## IPP FACULTY 7/16

Graca	Almeida-Porada	Regenerative Medicine	<a href="mailto:galmeida@wakehealth.edu">galmeida@wakehealth.edu</a>	713-1630
Susan	Appt	Pathology	<a href="mailto:sappt@wakehealth.edu">sappt@wakehealth.edu</a>	716-1637
Laura	Baker	Gerontology & Geriatric Medicine	<a href="mailto:ldbaker@wakehealth.edu">ldbaker@wakehealth.edu</a>	713-8830
Anthony	Atala	Regenerative Medicine	<a href="mailto:aatala@wakehealth.edu">aatala@wakehealth.edu</a>	716-5701
Sarah	Berga	Obstetrics and Gynecology	<a href="mailto:sberga@wakehealth.edu">sberga@wakehealth.edu</a>	716-4594
Michael	Berry	Health and Exercise Science	<a href="mailto:berry@wfu.edu">berry@wfu.edu</a>	758-5847
Colin	Bishop	Regenerative Medicine	<a href="mailto:cbishop@wakehealth.edu">cbishop@wakehealth.edu</a>	713-7273
Khalil	Bitar	Regenerative Medicine	<a href="mailto:kbitar@wakehealth.edu">kbitar@wakehealth.edu</a>	713-1470
Donald	Bowden	Center for Diabetes Research/Genomics	<a href="mailto:dbowden@wakehealth.edu">dbowden@wakehealth.edu</a>	713-7507
Bridget	Brosnihan	Hypertension & Vascular Disease Cntr	<a href="mailto:bbrosnih@wakehealth.edu">bbrosnih@wakehealth.edu</a>	716-2795
Pete	Brubaker	Cardiac Rehab Program	<a href="mailto:pbrubake@wfu.edu">pbrubake@wfu.edu</a>	758-4683
Evgeny	Budygin	Physiology & Pharmacology	<a href="mailto:ebudygin@wakehealth.edu">ebudygin@wakehealth.edu</a>	716-8530
David	Carroll	Nanotechnology & Molecular Materials	<a href="mailto:nanotech@wfu.edu">nanotech@wfu.edu</a>	758-5508
David	Caudell	Pathology	<a href="mailto:dcaudell@wakehealth.edu">dcaudell@wakehealth.edu</a>	716-4763
Mark	Chappell	Hypertension & Vascular Disease Cntr	<a href="mailto:mchappel@wakehealth.edu">mchappel@wakehealth.edu</a>	716-9236
Rong	Chen	Physiology & Pharmacology	<a href="mailto:rchen@wakehealth.edu">rchen@wakehealth.edu</a>	716-8605
Steven	Childers	Physiology & Pharmacology	<a href="mailto:childers@wakehealth.edu">childers@wakehealth.edu</a>	716-3791
Ski	Chilton	Physiology & Pharmacology	<a href="mailto:schilton@wakehealth.edu">schilton@wakehealth.edu</a>	713-7105
J. Mark	Cline	Pathology/Comparative Medicine	<a href="mailto:jmcline@wakehealth.edu">jmcline@wakehealth.edu</a>	716-1564
Katherine	Cook	Hypertension & Vascular Disease Cntr	<a href="mailto:klcook@wakehealth.edu">klcook@wakehealth.edu</a>	716-6634
Suzanne	Craft	Gerontology & Geriatric Medicine	<a href="mailto:suzcraft@wakehealth.edu">suzcraft@wakehealth.edu</a>	713-8830
Tracy	Criswell	Regenerative Medicine	<a href="mailto:tcriswell@wakehealth.edu">tcriswell@wakehealth.edu</a>	713-1615
Paul	Czoty	Physiology & Pharmacology	<a href="mailto:pczoty@wakehealth.edu">pczoty@wakehealth.edu</a>	713-7112
James	Daunais	Physiology & Pharmacology	<a href="mailto:jdaunais@wakehealth.edu">jdaunais@wakehealth.edu</a>	713-7185
Sam	Deadwyler	Physiology & Pharmacology	<a href="mailto:sdeadwyl@wakehealth.edu">sdeadwyl@wakehealth.edu</a>	716-8540
Osvaldo	Delbono	Gerontology & Geriatric Medicine	<a href="mailto:odelbono@wakehealth.edu">odelbono@wakehealth.edu</a>	716-9802
Debra	Diz	Hypertension & Vascular Disease Cntr	<a href="mailto:ddiz@wakehealth.edu">ddiz@wakehealth.edu</a>	716-5819
Matthew	Edwards	Vascular & Endovascular Surgery	<a href="mailto:medwards@wakehealth.edu">medwards@wakehealth.edu</a>	716-4151
James	Eisenach	Anesthesiology	<a href="mailto:eisenach@wakehealth.edu">eisenach@wakehealth.edu</a>	716-4498
Charles	Eldridge	Physiology & Pharmacology	<a href="mailto:eldridge@wakehealth.edu">eldridge@wakehealth.edu</a>	716-8570
Carlos	Ferrario	General Surgery	<a href="mailto:cferrari@wakehealth.edu">cferrari@wakehealth.edu</a>	716-9266
Mark	Ferris	Physiology & Pharmacology	<a href="mailto:mferris@wakehealth.edu">mferris@wakehealth.edu</a>	716-8620
Jorge	Figueroa	Obstetrics & Gynecology	<a href="mailto:figueroa@wakehealth.edu">figueroa@wakehealth.edu</a>	716-2351
David	Friedman	Physiology & Pharmacology	<a href="mailto:dfriedmn@wakehealth.edu">dfriedmn@wakehealth.edu</a>	713-7186
Patricia	Gallagher	Hypertension & Vascular Disease Cntr	<a href="mailto:pgallagh@wakehealth.edu">pgallagh@wakehealth.edu</a>	716-4455
Randolph	Geary	Pathology/Comparative Medicine	<a href="mailto:rgeary@wakehealth.edu">rgeary@wakehealth.edu</a>	716-4151
William	Gmeiner	Cancer Biology	<a href="mailto:bgmeiner@wakehealth.edu">bgmeiner@wakehealth.edu</a>	716-6216
Dwayne	Godwin	Neurobiology & Anatomy	<a href="mailto:dgodwin@wakehealth.edu">dgodwin@wakehealth.edu</a>	716-9437
Leanne	Groban	Anesthesiology	<a href="mailto:lgroban@wakehealth.edu">lgroban@wakehealth.edu</a>	716-4498
TanYa	Gwathmey-Williams	Hypertension & Vascular Research Cntr	<a href="mailto:tgwathme@wakehealth.edu">tgwathme@wakehealth.edu</a>	716-9524
Karen	Haas	Microbiology and Immunology	<a href="mailto:knhaas@wakehealth.edu">knhaas@wakehealth.edu</a>	716-0966
Robert	Hampson	Physiology & Pharmacology	<a href="mailto:rhampson@wakehealth.edu">rhampson@wakehealth.edu</a>	716-8541
David	Herrington	Cardiology	<a href="mailto:dherring@wakehealth.edu">dherring@wakehealth.edu</a>	716-4950

Timothy	Howard	Center for Genomic/Personalized Med Res	<a href="mailto:tdhoward@wakehealth.edu">tdhoward@wakehealth.edu</a>	713-7509
Allyn	Howlett	Physiology & Pharmacology	<a href="mailto:ahowlett@wakehealth.edu">ahowlett@wakehealth.edu</a>	716-8545
Sara	Jones	Physiology & Pharmacology	<a href="mailto:srjone@wakehealth.edu">srjone@wakehealth.edu</a>	716-8533
Jim	Jordan	Cardiothoracic Surgical Sciences	<a href="mailto:jejordan@wakehealth.edu">jejordan@wakehealth.edu</a>	716-4931
Matthew	Jorgenson	Pathology/Comparative Medicine	<a href="mailto:mjorgens@wakehealth.edu">mjorgens@wakehealth.edu</a>	716-6935
Jay	Kaplan	Pathology/Comparative Medicine	<a href="mailto:jkaplan@wakehealth.edu">jkaplan@wakehealth.edu</a>	716-1522
Jeff	Katula	Health and Exercise Science	<a href="mailto:katulaj@wfu.edu">katulaj@wfu.edu</a>	758-3612
Kylie	Kavanaugh	Pathology/Comparative Medicine	<a href="mailto:kkavanag@wakehealth.edu">kkavanag@wakehealth.edu</a>	716-1555
Kenneth	Kishida	Physiology and Pharmacology	<a href="mailto:kkishida@wakehealth.edu">kkishida@wakehealth.edu</a>	716-0419
Holden (Mei-Chaun)	Ko	Physiology and Pharmacology	<a href="mailto:mko@wakehealth.edu">mko@wakehealth.edu</a>	713-5466
Nancy	Kock	Pathology/Comparative Medicine	<a href="mailto:nkock@wakehealth.edu">nkock@wakehealth.edu</a>	713-7389
Greg	Kucera	Internal Med/Hematology & Oncology	<a href="mailto:gkucera@wakehealth.edu">gkucera@wakehealth.edu</a>	716-6348
Cynthia	Lees	Pathology/Comparative Medicine	<a href="mailto:clees@wakehealth.edu">clees@wakehealth.edu</a>	716-1590
Nicole	Levi-Polyachenko	Plastic and Reconstructive Surgery	<a href="mailto:nlevi@wakehealth.edu">nlevi@wakehealth.edu</a>	713-8502
Tao	Ma	Internal Medicine/Gerontology	<a href="mailto:tma@wakehealth.edu">tma@wakehealth.edu</a>	713-3741
Anthony P.	Marsh	Health and Exercise Science	<a href="mailto:marshap@wfu.edu">marshap@wfu.edu</a>	758-4643
Frank	Marini	Regenerative Medicine	<a href="mailto:fmarini@wakehealth.edu">fmarini@wakehealth.edu</a>	713-1471
Thomas	Martin	Anesthesiology	<a href="mailto:tjmartin@wakehealth.edu">tjmartin@wakehealth.edu</a>	716-8554
Brian	McCool	Physiology & Pharmacology	<a href="mailto:bmccool@wakehealth.edu">bmccool@wakehealth.edu</a>	716-8608
Stephen	Messier	Health and Exercise Science	<a href="mailto:messier@wfu.edu">messier@wfu.edu</a>	758-5849
Shannon	Mihalko	Health and Exercise Science	<a href="mailto:mihalksl@wfu.edu">mihalksl@wfu.edu</a>	758-1945
Gary	Miller	Health and Exercise Science	<a href="mailto:millergd@wfu.edu">millergd@wfu.edu</a>	758-1901
Anthony	Molina	Gerontology & Geriatric Medicine	<a href="mailto:amolina@wakehealth.edu">amolina@wakehealth.edu</a>	713-8584
Nilamadhav	Mishra	Internal Med/Rheumatology & Immunology	<a href="mailto:nmishra@wakehealth.edu">nmishra@wakehealth.edu</a>	716-4209
Michael	Nader	Physiology & Pharmacology	<a href="mailto:mnader@wakehealth.edu">mnader@wakehealth.edu</a>	713-7172
Maggie	Ng	Center of Genomics & Personalized Med. Res.	<a href="mailto:mng@wakehealth.edu">mng@wakehealth.edu</a>	716-6310
Barbara	Nicklas	Gerontology & Geriatric Medicine	<a href="mailto:bnicklas@wakehealth.edu">bnicklas@wakehealth.edu</a>	713-8569
Pat	Nixon	Health and Exercise Science	<a href="mailto:nixonpa@wfu.edu">nixonpa@wfu.edu</a>	758-4642
John S.	Parks	Pathology/Lipid Sciences	<a href="mailto:jparks@wakehealth.edu">jparks@wakehealth.edu</a>	716-2145
Snezana	Petrovic	Medicine/Physiology & Pharmacology	<a href="mailto:snpetrov@wakehealth.edu">snpetrov@wakehealth.edu</a>	713-7172
Christopher	Porada	Regenerative Medicine	<a href="mailto:cporada@wakehealth.edu">cporada@wakehealth.edu</a>	713-1655
Linda	Porrino	Physiology & Pharmacology	<a href="mailto:lporrino@wakehealth.edu">lporrino@wakehealth.edu</a>	716-8590
Wayne	Pratt	Psychology	<a href="mailto:prattwe@wfu.edu">prattwe@wfu.edu</a>	758-5745
Victor	Pulgar	Obstetrics & Gynecology	<a href="mailto:vpulgar@wakehealth.edu">vpulgar@wakehealth.edu</a>	716-5149
Tom	Register	Pathology/Comparative Medicine	<a href="mailto:register@wakehealth.edu">register@wakehealth.edu</a>	716-1557
Jack	Rejeski	Health and Exercise Science	<a href="mailto:rejeski@wfu.edu">rejeski@wfu.edu</a>	758-5837
Kimberly	Raab-Graham	Physiology and Pharmacology	<a href="mailto:kraabgrah@wakehealth.edu">kraabgrah@wakehealth.edu</a>	716-6072
Jim	Rose	Obstetrics & Gynecology	<a href="mailto:jimrose@wakehealth.edu">jimrose@wakehealth.edu</a>	716-4614
Hossam	Shaltout	Hypertension & Vascular Research Cntr	<a href="mailto:hshaltou@wakehealth.edu">hshaltou@wakehealth.edu</a>	716-1251
Carol	Shively	Pathology/Comparative Med, Psychology	<a href="mailto:cshively@wakehealth.edu">cshively@wakehealth.edu</a>	716-1524
Tom	Smith	Orthopaedics	<a href="mailto:tsmith@wakehealth.edu">tsmith@wakehealth.edu</a>	716-3950
Shay	Soker	Regenerative Medicine	<a href="mailto:ssoker@wakehealth.edu">ssoker@wakehealth.edu</a>	713-7295
David	Soto-Pantoja	Hypertension & Vascular Res Center	<a href="mailto:dsotopan@wakehealth.edu">dsotopan@wakehealth.edu</a>	716-0792

Ann	Tallant	Hypertension & Vascular Disease Center	<a href="mailto:atallant@wakehealth.edu">atallant@wakehealth.edu</a>	716-2108
Johnnie Foye	Talley	Health and Exercise Science	<a href="mailto:foyej@wfu.edu">foyej@wfu.edu</a>	758-5396
Robert	Taylor	Obstetrics & Gynecology	<a href="mailto:rtaylor@wakehealth.edu">rtaylor@wakehealth.edu</a>	716-5451
Allen	Tsang	Molecular Medicine	<a href="mailto:atsang@wakehealth.edu">atsang@wakehealth.edu</a>	716-5962
Jasmina	Varagic	Hypertension & Vascular Disease Center	<a href="mailto:jvaragic@wakehealth.edu">jvaragic@wakehealth.edu</a>	716-2738
Richard	Weinberg	Internal Medicine/Gastroenterology	<a href="mailto:weinberg@wakehealth.edu">weinberg@wakehealth.edu</a>	713-1180
Jeff	Weiner	Physiology & Pharmacology	<a href="mailto:jweiner@wakehealth.edu">jweiner@wakehealth.edu</a>	716-8692
Koudy	Williams	Regenerative Medicine	<a href="mailto:kwilliam@wakehealth.edu">kwilliam@wakehealth.edu</a>	713-1323
Jeffrey	Willey	Radiation Oncology/Biology	<a href="mailto:jwilley@wakehealth.edu">jwilley@wakehealth.edu</a>	713-7637
Liliya	Yamaleyeva	Hypertension & Vascular Research Cntr	<a href="mailto:lyamaley@wakehealth.edu">lyamaley@wakehealth.edu</a>	716-2155
Raghunatha	Yammani	Internal/Molecular Medicine	<a href="mailto:ryammani@wakehealth.edu">ryammani@wakehealth.edu</a>	716-1578
Daniel	Yohannes	Physiology & Pharmacology	<a href="mailto:dyohanne@wakehealth.edu">dyohanne@wakehealth.edu</a>	713-1556
James	Yoo	Regenerative Medicine	<a href="mailto:jyoo@wakehealth.edu">jyoo@wakehealth.edu</a>	713-7294



## Resources

WFU Graduate School Student Handbook:

<http://graduate.wfu.edu/docs/academics/GradStudentHandbook.pdf>

Student Wellness Center: <http://graduate.wfu.edu/students/SWC.html>

CareNet Counseling Services: [http://graduate.wfu.edu/students/bg\\_carenet.html](http://graduate.wfu.edu/students/bg_carenet.html)

Health and Effectiveness Council: <https://ewake.wakehealth.edu/hec/>

Contact for international Students (F1 status) – Elizabeth Whitsett Bowman Gray Campus  
[bwhitset@wakehealth.edu](mailto:bwhitset@wakehealth.edu)

Sexual Offense Prevention and Response website:

<http://intranet.wakehealth.edu/Departments/SOPR/>

Security Intranet site (personal tips and crime log):

<http://intranet.wakehealth.edu/Departments/Security/>

Additional resources: <http://graduate.wfu.edu/students/>

**Wake Forest University School of Medicine—Integrated Physiology and Pharmacology  
2016-2017 Graduate Students**



A. Johansen      A. Kwok      J. Mackert      M. Minkiewicz      F. Ryalat



M. Collard      A. Dyevoich      D. Luessen      T. Stowe



S. Ewin      R. Dushime      Z. Zabarsky      R. Magalhaes      K. Michalson



A. Bashore      S. Day      O. Rahimi      M. Zarif pour



M. Guan

**MD/PhD Student**



P. Patil

**Master Students**



L. Ghiraldeli      T. Hinshaw      E. Ortiz      J. Poteracki      E. Vidrascu      J. Martinez      D. Omoyeni