**Contact Information**

**UNC Eshelman School of Pharmacy**
Visit Program Website (http://pharmacy.unc.edu)

Michael Jarstfer, Assistant Dean for Graduate Studies
jarstfer@unc.edu

The UNC Eshelman School of Pharmacy offers graduate programs leading to the master of science in pharmaceutical sciences with a specialization in health-system pharmacy administration and to the doctor of philosophy in pharmaceutical sciences with concentrations in one of four research areas: chemical biology and medicinal chemistry; pharmacoengineering and molecular pharmaceutics; pharmacotherapy and experimental therapeutics; or pharmaceutical outcomes and policy. Students from the master of science in pharmaceutical sciences with a specialization in health-system pharmacy administration are competitive for careers in administrative positions in hospital pharmacies and other health systems. Students in from the Ph.D. program are competitive for careers in academia, pharmaceutical companies, biotech companies, government agencies such as the FDA, CDC, and NIH, nonprofit research organizations, and a variety of alternative careers including patent law, venture capital, and entrepreneurialism.

Instruction emphasizes contemporary research methods, study design, and results and is delivered in the form of small group lectures/discussions, group activities and recitations, and seminars combined with intensive laboratory-based research. The excellent rapport that exists between schools, departments, institutes, and centers within the University facilitates interdisciplinary collaborative research by graduate students and faculty. The graduate degree programs also benefit from faculty affiliations with GlaxoSmithKline, Inc., the Research Triangle Institute, the Hamner Institutes for Health Sciences, Duke University, the Wake Forest University School of Medicine, and many other organizations in the Research Triangle Park area. The UNC Eshelman School of Pharmacy is housed in Beard Hall, Kerr Hall, Marsico Hall, and the Genetic Medicine Building, which are located on the health sciences campus together with the Adams Schools of Dentistry, the School of Medicine, the School of Nursing and the Gillings School of Global Public Health. The Health Sciences Library has an outstanding collection of books and journals as well as computer and support services. Library and laboratory resources residing in other University departments are also available for use by students and faculty.

**Admission to the Ph.D. Program**

Applicants who have completed a standard collegiate curriculum in pharmacy, chemistry, biochemistry, biology, engineering, or in an allied field in the University, or in other universities or colleges having curricula acceptable to UNC—Chapel Hill's Graduate School, are eligible for admission to the graduate program in pharmaceutical sciences. Applicants must submit Graduate Record Examination scores, letters of recommendation, official transcripts, and a statement of personal goals as they relate to graduate study at the UNC Eshelman School of Pharmacy.

The Graduate School online application (http://gradschool.unc.edu/admissions/) is the standard means of applying for admission. Inquiries concerning admission to programs in the pharmaceutical sciences may be directed to the Office of Curricular and Student Affairs, CB# 7566, 109 Beard Hall, Chapel Hill, NC 27599-7566.

All applications to the UNC Eshelman School of Pharmacy's Ph.D. in pharmaceutical sciences program must be submitted through the UNC Graduate School.

**Deadlines**

Review of applications begins December 1 and we strongly recommend that applications are completed prior to that deadline. Although you can apply until February 13, completing your application before December 1 will maximize your chances of acceptance and nomination for UNC Graduate School fellowships.

**Application Requirements**

- Graduate School application
- Nonrefundable $87.50 application fee
- Three current letters of recommendation: When filling out the Graduate School application, applicants will be asked to submit the e-mail addresses of the recommenders who will then receive an e-mail with information for logging into the system to submit their letters.
- Transcripts
- GRE test scores that are no more than five years old
- Statement of purpose (see below)
- A current e-mail address (the Graduate School only uses e-mail to communicate with applicants)

**Notes**

- For Question 2 on the application, make sure you scroll down the list until you see "School of Pharmacy." In the dropdown menu for School of Pharmacy, please select Pharmaceutical Sciences.
- Applicants must indicate only one choice on their application for their division of interest or specialization. Only the first choice of division (i.e., area of interest or specialization) will be considered on their application. Applicants should also describe this choice in their statement of purpose.
- Being admitted to The Graduate School does not imply that you will receive financial assistance of any kind. The awarding of financial assistance is a separate decision.

**Questions**

Consult the Graduate School's application instructions (http://gradschool.unc.edu/admissions/instructions.html) or contact gradinfo@unc.edu.

**Statement of Purpose**

To assist in the evaluation of your application, please provide a concise personal statement including the following information.

- Why do you wish to pursue graduate study in pharmaceutical sciences?
- Why do you wish to engage in graduate study in this institution?
- What are your reasons for selecting your first choice of division (i.e., area of interest or specialization)?
- What do you offer that will enrich our graduate program? Please include factors such as:
  - Work, teaching, or other life experiences
  - Meaningful events that have influenced your life and career choices
  - Communication abilities
• Problem-solving skills
• Are you a leader, follower, or team player?
• History of overcoming challenges or disadvantages
• Cultural diversity (this may include ethnic background, race, and other attributes that define your cultural background)
• If possible, please identify the specific research areas in which you plan to focus your graduate studies. Is there a particular faculty member with whom you would like to work?

**Admission to the M.S. Program**

Applicants to the master’s program must meet both of the following requirements:

1. Be a licensed pharmacist in the U.S.
2. Hold a Doctor of Pharmacy (Pharm.D.) or the equivalent

Everything detailed below must be completed prior to the deadline for your application to be considered.

Interested applicants will need to apply to the University of North Carolina Graduate School for their didactic component. The applicant will also need to complete separate applications for each residency program to which they wish to apply — UNC Hospitals, Duke University Health System, Wake Forest Baptist Hospital, Mission Health in Asheville, or Moses Cone in Greensboro. Applicants need only to apply to their residency programs of interest.

Individual interview days will be scheduled at times convenient for applicants and institutions. Each applicant and program will communicate to identify the ideal time to conduct the interview. Our hope is to have all of the interviews for an applicant in one consecutive period.

Each program will participate in the match, but each one has a different match number. If you have not done so already, please make sure to register for the National Matching Service offered through ASHP. Currently there are four positions available at UNC, one at Duke, two at Wake Forest, one at Mission Health and one at Moses Cone for a total of nine per cohort.

**Application Procedures**

- Complete a Graduate School application for admission (see link below)
- Create an online account
- Fill out the application information as follows:
  - Level of Study: Graduate
  - Type of Applicant: New degree-seeking applicant
  - Major: Pharmaceutical Sciences
  - Degree: Master of Science
  - Area of Interest or Specialization: Practice Advancement and Clinical Education
- Select the term of entry
- Fill out the applicant information
- Fill out educational background
- Upload your **unofficial** transcripts — undergraduate and graduate
- Upload a statement of purpose
- GRES are waived for applicants with a Pharm.D. degree and a GPA greater than 3.0
- Upload a copy of your CV/resume
- Submit the application and pay the non-refundable $85 application fee
- Provide three letters of recommendation (may be identical to those provided for the residency program application) using the recommendations link on the online application under “Important Links”
- Have your graduate and undergraduate school submit an official academic transcript for each school attended. The graduate school will request official transcripts after acceptance into the program only.

* Please note: The GRE waiver applies to applicants possessing a Pharm.D. with a GPA greater than 3.0. Qualified applicants may submit an online application without entering this standardized test score. Although your application status may show “incomplete,” this status will not be held against you at the time of review, and the waiver will be honored if you are offered admission to our M.S. program.

**Graduate Assistantships and Fellowships in the UNC Eshelman School of Pharmacy**

Research assistantships in the UNC Eshelman School of Pharmacy provide a competitive stipend, health insurance, tuition, and fees for 12 months’ service. All awards are made on a competitive basis with consideration given to the applicant’s academic record and research experience. Information concerning these assistantships, fellowships, and traineeships may be obtained by writing directly to the Office of Research and Graduate Education at the UNC Eshelman School of Pharmacy.

**Chemical Biology and Medicinal Chemistry**

Chemical biology and medicinal chemistry are multidisciplinary fields that integrate organic chemistry, biochemistry, molecular biology, structural biology, pharmacology, and physiology. The research in the division applies and extends the basic concepts of chemistry, biochemistry, and pharmacology to the investigation of biomedical problems. General areas of study include structure-activity relationships, drug-receptor interactions, synthetic drug design, and target discovery and validation. Specific focus areas include cancer chemotherapy, computer-aided drug design, enzymology, glycobiology, molecular modeling, natural products, neurochemistry, parasitology, and structural biology.

**Pharmacoengineering and Molecular Pharmaceutics**

Pharmacoengineering and molecular pharmaceutics represents interdisciplinary specialties encompassing a range of scientific endeavors, including the design, fabrication, evaluation, use of, and delivery strategies for dosage forms; elucidation of the behavior of pharmacologic agents in biologic systems; determination of the ability of pharmacologic agents to reach the relevant site of biologic effect; and determination of the time course of biologic activity.

These areas of specialization represent critical steps in the development of new therapeutic agents, the evaluation of new and existing drugs, and the optimal clinical use of pharmacologic agents.

Students in the Division of Pharmacoengineering and Molecular Pharmaceutics are required to participate in a common core of entry-level graduate courses. This core provides a broad perspective of the pharmaceutical sciences as well as an appreciation for how different
subdisciplines interact. Many dissertation projects are collaborative in nature and rely upon interactions with faculty in other divisions of the UNC Eshelman School of Pharmacy, as well as with colleagues in the UNC School of Medicine, the Department of Chemistry, or at pharmaceutical companies or institutions located in the Research Triangle Park area.

Pharmaceutical Outcomes and Policy
The Division of Pharmaceutical Outcomes and Policy offers a Ph.D. program in pharmaceutical sciences emphasizing an interdisciplinary approach to addressing issues relevant to medication use at the patient, provider, community, and societal levels. Faculty research interests and course offerings reflect this interdisciplinary orientation. Students develop knowledge and skills that enable them to conduct high quality research directed at improving the use and cost effectiveness of medications, technology, and services. Education and research in the division draws heavily upon expertise in numerous fields such as health services research, health policy, health communication, health behavior and behavior change, epidemiology, and psychometrics. Areas of faculty and student research include communication and decision making, comparative effectiveness of medications and pharmacy practice models, medication adherence and self-management, health disparities, health literacy, patient reported outcomes assessment, pharmaceutical policy analysis, and policy and ethical issues related to pharmagenomics.

Pharmacotherapy and Experimental Therapeutics
The Division of Pharmacotherapy and Experimental Therapeutics offers a Ph.D. program in the pharmaceutical sciences with a focus on translational research that integrates biomedical and pharmaceutical sciences in both laboratory-based models and in humans. The goal of the program is to develop scientists who are prepared to generate and disseminate new knowledge in pharmaco therapy and accelerate its application to improve patient care. Graduate students engage in clinical experiences throughout the program that are designed to complement each student’s research interests while also facilitating their development as translational scientists. Areas of graduate coursework and research include drug metabolism and transport, pharmacokinetics/pharmacodynamics/pharmacometrics, pharmacogenomics, clinical research, drug development, experimental therapeutics, and mechanisms of drug toxicity. Therapeutic and research areas of particular strength include cardiovascular disease, infectious disease/HIV, oncology/hematology, hepatology/gastroenterology/transplant, and pulmonary disease.

Master of Science in Pharmaceutical Sciences
The Eshelman School of Pharmacy offers a master of science in pharmaceutical sciences with a specialization in health-systems pharmacy.

The M.S. program prepares pharmacists for leadership positions in health care systems. To accomplish this goal, the program provides students with the knowledge, skills, and experience necessary to assume a variety of roles and responsibilities. Graduates serve as vibrant, committed professionals with a focus on improving patients’ health, health care delivery, and the profession of pharmacy. This occurs through both didactic education and experiential opportunities in class and in the workplace.

Distinguished Professors

Jeffery Aubé, Synthetic Organic/Medicinal Chemistry, Neuroscience, Infectious Disease, Cytochrome P450 Biochemistry
Kim L.R. Brouwer, Hepatobiliary Drug Disposition, Drug Transport, Prediction of Drug Interactions and Haptotocytotoxicity, Clinical Pharmacokinetics and Quantitative Systems Pharmacology
Stephen Frye, Drug Design and Discovery, Chemical Biology of Chromatin Regulation
Angela Kashuba, Clinical Pharmacology of Antiretroviral Agents in HIV Treatment, Prediction of Drug-Drug and Drug-Cytokine Interactions and Adverse Effects, Role of Sex and Ethnicity in Drug Disposition
Leaf Huang, Gene Therapy, Targeted Gene/Drug Delivery in Tumor Microenvironment
Michael Jay, Pharmaceutical Formulation Development, Nuclear Sciences
David Lawrence, Application of Chemical Tools to Biological Questions: Enzyme Sensors; Light-Activated Inhibitors, Sensors, and Signaling Proteins; Light-Induced Gene Expression; Chemical Genomics
Kuo-Hsiung Lee, Medicinal Chemistry of Bioactive Natural Products and Synthetic Analogos including Antitumor, Anti-Aids, Antimalarial, Antihyperlipidemic, Anti-Inflammatory, Anti-Arthritis, and Antiviral Agents; Antifungal Antibiotics; Insect Antifeedants; Chinese Herbal Medicine
Weili Lin, Cerebral Ischemia, Human Brain Development, PET, MR
Jian Liu, Carbohydrate Biochemistry, Structural and Functional Relationships of Heparan Sulfate
Betsy L. Sleath, Provider-Patient Communication about Medications, Child and Adolescent Health, Health Disparities, Improving Adherence to Medication Regimens
Dhiren R. Thakker, Mechanisms of Drug Transport, Pro-Drug Strategies for Enhanced and Targeted Drug Delivery, Disposition of Macromolecules (e.g., Genes)
Alexander Tropsha, Molecular Modeling, Computer-Assisted Drug Design, Molecular Dynamics of Proteins, Protein Folding
Xiao Xiao, Gene Therapy for Muscular Dystrophy and Other Genetic Diseases

Professor of the Practice

Jerry Heneghan, Practice Advancement and Clinical Education

Professors

J. Herbert Patterson, Individualized Pharmacotherapy of Heart Failure, Precision Dosing
Robert A. Blouin, Effects of Infectious Disease and Trauma on Altered Physiologic States (i.e., Aging and Obesity) and the Expression and Regulation of Drug Metabolizing Enzymes
Alexander Kabanov, Polymer-Based Drug Transport, Drug, Gene, and Protein Delivery Systems and Novel Therapeutics for Cancer and Neurodegenerative and Neurodevelopmental Diseases
Jennifer Elston Lafata, Cancer Care Delivery; Quality Improvement; Patient-Provider Communication and Decision Making; Medication Adherence
Andrew Lee, Structural Biology, NMR Spectroscopy, Protein Dynamics, Biophysical Dissection of Proteins and Protein-Ligand Interactions
Paul Watkins, Clinical Pharmacology, Drug-Induced Liver Injury

Associate Professors

Kristy Ainslie, Formulation of Vaccines and Drug Delivery Treatments for Immune Modulation to Treat and Prevent Infectious and Other Diseases
Albert Bowers, Drug Discovery, Natural Products and Synthetic Biology
Gang Fang, Pharmacoepidemiology, Medication Adherence, Evaluation of Treatment Utilization and Outcomes in Populations, Comparative
Treatment Effects Research, Patient-Centered Outcomes, Health Disparities
Shawn Hingtgen, Personalized Cell-Based Therapies for Cancer, Developing Novel Polymer Implant Strategies to Treat Surgically Resected Brain Cancer

Federico Innocenti, Clinical Pharmacology–Oncology/Pharmacogenomics
Michael B. Jarstfer, Chemical Biology to Study Social Behavior and Telomere Biology
Sam Lai, Mucosal Immunity, Antibody Engineering, Antibody Response to Nanomaterials, Targeted Drug Delivery, Bacteriophage Engineering, Vaccines
Craig R. Lee, Cardiovascular Biology, Genomics and Biomarkers, Eicosanoid Metabolism, Inflammation
Rhie Liu, Proteomics and Functional Genomics
Mary T. Roth-McClurg, Medication Management in Primary Care, Clinical Pharmacists and the Medical Home, Medication Management and Medical Home, the Quality of Medication Use and Drug Administration
Wayne Pittman, Hypertension, Clinical Pharmacokinetics, Cardiology and Drug Administration
Scott Singleton, Bio-Organic and Biophysical Chemical Investigations of the Mechanisms DNA Repair, Directed Evolution of Novel Enzymes, Development of Alternate Strategies for Targeting Drug-Resistant Pathogenic Microorganisms
Kathleen Thomas, Access to Care, Underserved Populations, Mental Health
Carolyn Thorpe, Diabetes, Cognitive Impairment, Systemic Vasculitis, Hypertension, Dementia, Rheumatoid Arthritis
Joshua Thorpe, Access to Care, Comparative Effectiveness of Treatment Options and Management Strategies, Geriatric Health Services Research
Philip C. Smith, Pharmacokinetics, Drug Metabolism, Quantitative Targeted Proteomics
Dennis M. Williams, Inhalation Therapy for Pulmonary Disease, Hypertension, Clinical Pharmacokinetics, Infectious Diseases
Timothy J. Wiltshire, Preclinical and Clinical Pharmacogenetics, and Genomics, Precision Dosing/Pharmacotherapy
William C. Zamboni, Optimization of Chemotherapeutic Treatment of Cancer, Pharmacokinetics, Pharmacodynamics, Pharmacogenetics
Qisheng Zhang, Lipid Signaling and Small GTPases, Chemical Biology and Drug Discovery

Assistant Professors
Aaron Anselmo, Microbiome Delivery, Targeted Drug Delivery, Cell-Based Delivery, Determining the Role of Physicochemical Properties in the Delivery of Nanoparticles and Microbes
Rahima Bennhabour, Organic/Polymer Chemistry and Drug Delivery
Yanguang Cao, Pharmacokinetics, Pharmacodynamics, and Quantitative Pharmacology, Physiologic-Based Pharmacokinetics, Protein Therapeutics
Delesha Carpenter, Chronic Disease Self-Management, Medication Adherence, Patient-Provider Communication, mHealth, eHealth, Rural Health, Measurement, Asthma
Daniel J. Crona, Optimizing Treatments in Hematology/Oncology Through Pharmacogenetics, Pharmacokinetics and Pharmacodynamics
Julie Dumond, Pharmacometrics, Clinical Pharmacokinetics, Pharmacodynamics, HIV Treatment
Daniel Gonzalez, Pediatric Clinical Pharmacology, Precision Dosing
Nate Hathaway, Investigating the Regulation of the Mammalian Genome, Developing New Chemical-Mediated Tools to Examine Chromatin Structure and Function, and Drug Discovery
Klarissa Jackson, Drug Metabolism
Lindsey Ingerman James, Chemical Biology of Chromatin Regulation, Chemical Probe Development for Epigenetic Regulatory Proteins
Alan Kinlaw, Drug Use Patterns, Comparative Effectiveness and Safety of Medications
Jacqui Mclaughlin, Practice Advancement, Clinical Education, Computational Modeling
Robert McGinty, Structural Biology, Protein Chemistry, Epigenetics
Gauri Rao, Quantitative Systems Pharmacology, Pharmacometrics, Pharmacokinetic and Pharmacodynamic Modeling
Megan Roberts, Improved Implementation of Evidence-Based Precision Medicine, Disparities, Communication and Implementation of Genetic Technologies
Amanda Seyerle, Genomic of Human Health, Gene-Environment Interaction, Epigenomics in Health Disparities
Casey Tak, Access to Prenatal and Postpartum Health Services, Pharmaceuticals and Other Healthcare Interventions on Pregnancy-Related Outcomes

Research Professors
Dmitri Kireev, Computational Biophysics, Computer-Aided Drug Design, Drug Discovery Informatics
Kenneth Pearce, Lead Discovery and Characterization, Assay Development, Biochemistry
Michael Wagner, Pharmacogenomics, Translational Pharmacology
Tim Willson, Director of Structural Genomics Consortium at UNC, Medicinal Chemistry, Kinase Inhibitors

Research Associate Professors
Elena Batrakova, Development of Active Targeted Delivery of Therapeutic Peptides to the Brain for Treatment of Parkinson’s Disease Using Inflammatory-Response Cells as Vehicles, Development of Exosome-Mediated Drug Delivery Systems for Treatment of Cancer
David Drewry, Medicinal Chemistry, Kinase Inhibitors
Elias P. Rosen, Imaging Mass Spectrometry
Juan Li, Gene Therapy
Alexander Golbraikh, Chemical Biology and Medicinal Chemistry, Informatics
Eugene Murato, Molecular Modeling
Susan Morris-Natschke, Design, Synthesis, and Structural Optimization of Antiviral Phospholipids
Samantha Pattenden, Technology Development to Discover Chromatin-based Therapeutic Targets
Eric Smith, Radiopharmacy
Xiaodong Wang, Drug Discovery for Therapeutic Targets in Oncology
Yongmei Xu, Carbohydrate Chemistry and Biology
Bill Zuercher, Design, Synthesis and Utilization of Chemical Probes, Kinase Inhibitors

Research Assistant Professors
Alison Axtman, Synthesis of Small Molecules that Selectively Modulate Proteins Implicated in Disease-Propagating Pathway
Rachel Julia Church, Institute for Drug Safety Sciences
Mackenzie Cottrell, HIV Eradication, Clinical Pharmacology
Merrie W. Mosedale, Drug Toxicity, Organotype Culture Models, Exosome Biology
Eric Bachelder, Treatment of Autoimmune Diseases Through Modulation of Immune Responses with Microparticles
Dong Fu, Liver Cell Biology and Hepatic Pharmacology
Masuo Goto, Mechanism of Action Studies on Novel Natural Products and their Derivatives
Weigang Huang, Chemical Approaches to Explore the Phosphoinositides Related Cellular Process: 1) Development of Fluorogenic, Fluorescent, and Photoaffinity Labeling Probes; 2) Development of Small-Molecule Inhibitors for Phosphoinositides Metabolic Enzymes
Kevin Frankowski, Organic/Medicinal Chemistry, Therapeutic Areas of Interest: CNS Modulation and Cancer Treatment
Lindsey James, Chemical Biology of Chromatin Regulation, Chemical Probe Development for Epigenetic Regulatory Proteins
Andrew Lucas, Translational Oncology and Nanoparticle Drug Development Initiative
Samantha Pattenden, Chemical Biology of Chromatin Regulation
Melanie Priestman, Chemical Biology
Paul Sapienza, Biophysical Studies of Proteins and Macromolecular Interactions
Sarah Scarry, Medicinal Chemistry and Drug Discovery
Marina Sokolsky-Papkov, Stimuli Actuated Theranostic Drug Delivery Systems
Ruhang Tang, Molecular Pharmaceutics
Qunzhao Wang, Development of Biosensors to Visualize Behaviors of Protein Kinases in Live Cells
Xiang Wang, Molecular Modeling
Zhao Wang, Drug Metabolism and Pharmacokinetics
Hao Zhu, Molecular Modeling

Clinical Professors
Robert E. Dupuis, Clinical Pharmacokinetics, Drug Metabolism of Immunosuppressant in Organ Transplant Recipients, Relationship Between Drug Metabolism, Toxicity and Outcomes
Adam M. Persky, Pharmacy Education, Pharmacokinetics and Pharmacodynamics of Dietary Supplements
Jo Ellen Rodgers, Clinical and Translational Research in Heart Failure

Clinical Associate Professors
Amanda H. Corbett, Pharmacology of Antiretrovirals, Ethnopharmacology; Integrative Medicine Practices
Wendy Cox, Practice Advancement and Clinical Education
Stephen F. Eckel, Practice Advancement and Clinical Education
Scott Wayne Savage, Practice Advancement and Clinical Education

Clinical Assistant Professors
Amber Frick, Clinical Pharmacology and Pharmacogenomics
Jessica Greene, Pharmacy Education
Stephanie Kiser, Practice Advancement and Clinical Education
Nicole Pinelli-Reitter, Practice Advancement and Clinical Education
Amber Proctor, Thoracic Oncology, Hematology
David Steeb, Practice Advancement and Clinical Education

Adjunct Professors
Yuriy Abramov, Computational Sciences in Drug Discovery and Development
Kirkwood Adams Jr., Heart Failure and Cardiovascular Disease
Wayne Anderson
Nancy Allbritton, Signaling in Single Cells, Microfabrication Systems for Cellular Analysis
Nancy Cole Baker
Hugh A. Barton, Translational Modeling & Stimulation; Pharmacokinetics, Dynamics and Metabolism
Daniel K. Benjamin Jr., Pediatric Clinical Trials

M. Alan Brookhart, Epidemiology
Gilbert Burckart, Pharmacology, Pediatrics
Patricia J. Bush, Asthma
Paul Bush, Practice Advancement and Clinical Education
William Campbell, Pharmaceutical Policy
Michael Crimmins, New Methodology and Synthesis of Natural Products
Skip Cummings, Primary Care, Obesity and Diabetes
Patricia Deverka, Senior Research Director, Center for Medical Technology Policy
Joseph Desimone, Polymer Synthesis, Liquid and SupercrITICAL CO2 Processing, Gene Therapy and Drug Delivery
Nikolay Dokholyan, Computation/Experimental Biology and Structural Biology
Sean Ekins Collaborative Drug Discovery
Jean Paul Gagnon, Pharmaceutical Outcomes Research and the Pharmaceutical Industry
Robert Gomeni, Pharmacokinetics, Clinical Drug Development
John Grabenstein, U.S. Pharmacopeia and Vaccination
Klaus Hahn, Molecular Imaging Tools, Signaling Dynamics in Motility and Blood Cells
William Janzen, Assay Development and Compound Profiling
Clark D. Jeffries, Chemical Biology and Medicinal Chemistry
Brian Alvin Johns Drug Discovery
Kazunori Kataoka, Biomaterials
Natalia Klyachko, Biochemistry, Catalysis, Nanotechnology
Robert Konrad
Lawrence Lesko, Clinical Pharmacology and Drug Development
Qi Lu, Antisense Therapy for Muscular Dystrophy
Matthew Maciejewski, Pharmacoeconomics
Elaine Mardis, Characterization of Cancer Genomes, Genome Sequencing Technologies
Lesley Marson, Histology, Human Biology, Neuroscience
Howard Mcleod, Pharmacogenomics and Individualized Therapy
Alison Motsinger, Associate Professor, NC State Department of Statistics
Michael Murphy, Pharmaceutical Research in Molecular Genotyping
Kyoko Nakagawa-Goto Discovery and Development of Drug Candidates
David Nichols: Medicinal Chemistry on Psychoactive Drugs
Tudor Oprea:
Kouros Owzar, Biostatistics and Bioinformatics
Jai Patel, Levine Cancer Institute
Nita Patel, Senior Vice President, Operations, Artisan Pharma Inc.
Joseph Polli, Drug Metabolism and Transport
John Robert Powell, Clinical Pharmacology and Drug Development
D.K. Theo Raynor, Medication Risk Communication
Bryan Roth, GPCR Structure
Virginia Schmith, Pharmacokinetics, Pharmacodynamics, Pharmacometrics
Manmohan Singh, Vaccines and Biologics process and product development
Richard Stack, Cardiology, Medical Device Manufacturing
Til Sturmer, Epidemiology
Russell Thomas, Director, Center for Genomic Biology, EpidemioLogic Methods and Bioinformatics Clinical Epidemiology
Robert Voyksner, Tools for Bioanalytical Chemistry
Melea Ward, Pharmaceutical and Health Policy, Regulatory Science, Developing Product Launch Plans
Amelia Warner
Morris Weinberger, Health Policy and Clinical Trials
Daniel L. Weiner, Pharmaceutics and Pharmaceutical Biostatistics
Anthony Williams
Lan Xie
Daryl C. Zeldin, Respiratory Biology, Exposure Assessment and Prevention of Asthma, Eicosanoid Metabolism
Zhao Zhiang

**Adjunct Associate Professors**

Kirkwood Adams Jr., Heart Failure and Cardiovascular Disease
Elizabeth Andrews, Drug Safety and Compliance
Ronald Brashear, Chemical Heritage Foundation
Andrea K. Biddle, Health Economics and Public Policy Analysis
Robert R. Bies, Pharmacometrics
Matthew Burke, Pharmaceutical Development
Kenneth Brouwer, Biotechnology
William Brock, Toxicology, Pharmacology
David M. Cocchettro, Clinical Pharmacology, Antiviral/Antibacterial Regulatory Affairs
Ke Cheng, Regenerative Medicine
Gregory Daniel, Pharmaceutical Economics, Comparative Effectiveness, and Pharmaceutical, Biologic, and Vaccine Safety
Rowell Daniels, Practice Advancement and Clinical Education
Paul A. Dayton, Biomedical Engineering and Ultrasound
Marisa Domino, Health Economics
Sean Ekins, Collaborative Drug Discovery
Michael Fath, Pharmaceutical Strategic Marketing, Medical Affairs, and Commercial Operations
Ronald A. Fleming, Drug Development, Oncology
John Edgar French, Toxicology
Felix Frueh, Pharmacogenomics and Clinical Pharmacology
Alex Z. Fu, Cost Effectiveness and Pharmacoeconomics
Rampakash Govindarajan, Pharmacy
John Grabenstien, Pharmacy
Sandra Greene, Health Care Policy
Zhen Gu, Biomaterials Design, Biomacromolecular Engineering, and Micro/Nano-Fabrication
Alan Higgins, Preclinical Drug Development
Geoffrey Hird, Liquidia Technologies
William Janzen, Drug Discovery, High Throughput Screening, and Automation and Process Improvement
Clark D. Jefferies, Developing Assays for Small RNAs in Human Cell Lines and Tissue Samples and Developing Software to Interpret Small RNA Signatures as Diagnostics or Theranostics
John Kessler, Practice Advancement and Clinical Education
Nancy Allen Lapointe, Translational Research of Antiarrhythmic Drug Therapy
T. Bryant Mangum, Business Management, Pharmacy Leadership, and Managed Care
Kyoko Nakagawa-Goto, Discovery and Development of Drug Candidates through Total Syntheses and Synthetic Modifications of Bioactive Natural Products Focused on Antitumor and Anti-HIV Agents
David Nichols, Study of Hallucinogens (Psychedelics) and Discovery of Novel D1 Dopamine Receptor Full Agonists
Alan Parr, BioCeutics
Lars Pedersen, Structural Biology
Kenneth R. Phares, Drug Development, Preformulation and Formulation Development
Susan Sutherland, Epidemiology Research, Statistical Computing, Data Management, Study Design
Chris Waller, Molecular Modeling and Bioinformatics
Michael Wascovich, Pharmacy Leadership and Hospital Pharmacy Management
Russell Thomas, Genomic Biology and Bioinformatics
Dan Weiner, Pharmacometrics, Pharmaceutical Biostatistics

Lan Xie, Chemical Biology and Medicinal Chemistry
David Zaharoff, Vaccine and Immunotherapy Delivery
Weifan Zheng, Chemical Biology and Medicinal Chemistry
Issam Zineh, Pharmacogenomics and Clinical Pharmacology
Mark Zylka, Molecules and Mechanisms for Pain and Autism, Angelman Syndrome Therapies

**Adjunct Assistant Professors**

Hisham Aljahed, Pharmacoeconomics and Drug Safety
Christopher Blanchette, Epidemiology, Pharmaceutical Health Services Research, Healthcare Economics
Peter Bozalek, Pharmacokinetics Modeling Simulation
Alan Boyd, Neurocognitive Software Development
M. Alan Brookhart, Pharmacoeconomics
Yevgeny Brudno, Pharmacoeconomics
John Byrd, Evidence-Based Decision Making, Practice Outcomes Solutions and Application of Clinical, Economic, and Humanistic Outcomes Research
Jack W. Campbell, Pharmacy Law and Ethics
Scott Clark, Pharmacogenomics
Michael Cohen-Wolkowicz, Pediatric Clinical Pharmacology and Pharmacometrics
Austin Combest, Global Drug Development
Lynn Dressler, Pharmacoeconomics
Stephanie Earnshaw, Quality Management, Linear and Integer Programming and Network Optimization
Heather Edin
Eric C. Faulkner, Personalized Medicine Development
Mona Fiuzat, Heart Failure Drug Development and Pharmacogenomics
Kathy Foley, Rural Health, Demography, Sociology, and Health Outcomes Research
Justin Lee Geurink, Experimental Education
Giulia Ghibellini, Pharmacokinetics, Clinical Pharmacology
Alicia Gilsenan, Pharmacoeconomics and Therapeutic Risk Management
Natalia Gonzalez
Zongchao Han, Gene Expression Patterns
Allison Harrill, Toxicology, Drug-Induced Liver Injury
Matthew Lau, Health Outcomes
Charles Lee, Provider-Patient Communication
Martin Marcinia, Health Outcomes, Oncology, Neuroscience and Cardiovascular
Phil Mendys, Cardiovascular Drug Development and Preventive Cardiology
Steven R. Moore, Health Policy and Planning
Alison A. Motsinger, Pharmacogenetics, Bioinformatics
Jai N. Patel, Preclinical Drug Development
Nita Patel, Preclinical Drug Development
Eric Peters, Psychiatric and Cancer Pharmacogenomics
Matthew T. Fletcher, Genetics, Pharmacogenomics
Katharine Sheldon, Practice Advancement and Clinical Education
Richard Stanford, Health Outcomes Strategy and Research
Andrine Swenson, Development and Application of Epidemiological Methods
Russell Thomas, Genomic Biology and Bioinformatics
Andrew Z. Wang, Radiation Oncology, Nanomedicine
Jian Wang, Pharmacology, Regulatory Science, Pharmacoanalytics
David Wei, Pharmacy Outcomes and Evaluation
Keele Wurst, Epidemiology
Macej Zamek-Gliszczynski, Preclinical Drug Development
Professors Emeriti
William Campbell
George H. Cocolas
Dale Christensen
Anthony Hickey
James Heyward Hull, Drug Development, Cardiovascular Therapeutics
Khalid S. Ishaq
Rudolph Juliano
Hal Kohn
Tom S. Miya
G. Joseph Norwood

Subjects in this school include: Chemical Biology and Medicinal Chemistry (CBMC) (p. ), Pharmacoeengineering and Molecular Pharmaceutics (DPMP) (p. ), Pharmacotherapy and Experimental Therapeutics (DPET) (p. ), Practice Advancement and Clinical Education (PACE) (p. ), Pharmaceutical Outcomes and Policy (DPOP) (p. ), and Pharmaceutical Sciences (PHRS) (p. ).

Note that the courses listed below are not listed in the order and number of times that they must be completed. See the program's Web site for more detailed information about the sequence of courses and credit hour totals. The program's Web site also provides information about concentrations.

Chemical Biology and Medicinal Chemistry

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>CBMC 807</td>
<td>Foundations of Chemical Biology I: Organic and Medicinal Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CBMC 805</td>
<td>Molecular Modeling</td>
<td>3</td>
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Graduate level Biology course

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Pharmacoeengineering and Molecular Pharmaceutics

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Pharmacoengineering and Molecular Pharmaceutics

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Pharmacotherapy and Experimental Therapeutics

Clinician Track

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Non-Clinician Track

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Pharmaceutical Outcomes and Policy

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### UNC Eshelman School of Pharmacy (GRAD)

#### Practice Advancement and Clinical Education (Master's Program)

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<td>Overview of Health Systems</td>
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