DEPARTMENT OF PATHOLOGY AND LABORATORY MEDICINE (GRAD)

Graduate work in the Department of Pathology and Laboratory Medicine is offered through the Pathobiology and Translational Science graduate program to those interested in acquiring more extensive knowledge of disease pathogenesis. Major emphasis is given to the laboratory investigation of molecular and cellular mechanisms responsible for disease initiation, progression, and treatment. Students are given the opportunity to undertake candidacy for the doctor of philosophy degree. Participation in research activities leading to an original dissertation is required of all advanced degree candidates.

Prospective candidates must hold a bachelor’s degree from an accredited college or university. Admission to the program is through the Biologic and Biomedical Sciences program (http://bbsp.unc.edu/).

The department is located across multiple buildings on the UNC campus and offers well-equipped, internationally recognized laboratories for research and advanced work in investigating the mechanisms of diseases.

Please visit the graduate program’s website (https://www.med.unc.edu/pathology/) for more graduate program information.

Clinical Professors
Frederic Askin, Surgical Pathology, Pulmonary Pathology
Michelle Aurelius, Forensic Pathology
Peter Banks
Thomas W. Bouldin, Neuropathology, Ocular Pathology, Neurotoxicology
Russell R. Broaddus, Molecular Pathogenesis of Endometrial Cancer
Leslie G. Dodd, Surgical Pathology, Cytopathology
Ronald J. Falk, Glomerular Disease, Lupus, Vasculitis, Dialysis
George Fedorov, Hematopathology; Applications of Flow Cytometry
Paul Googe, Dermatopathology
Margaret L. Gulley, Molecular Diagnostics, Oncology, Epstein-Barr Virus
J. Charles Jennette, Renal Pathology, Immunopathology
Kathleen A. Kaiser-Rogers, Clinical Cytogenetics
David G. Kaufman, Human Origins of DNA Replication, Interactions Between Human Endometrial Epithelial and Stromal Cells
Susan J. Maygarden, General Surgical Pathology, Cytopathology, Prostate Carcinogenesis
Melissa B. Miller, Molecular Diagnostics, Antimicrobial Resistance, Molecular Epidemiology of MRSA
Volker Nickeleit, Renal Pathology, Fibronectins
Yara Park, Transfusion Medicine
Charles M. Perou, Breast Cancer, Genomics, Microarrays, Tumor Classification, Drug Resistance
John L. Schmitz, Flow Cytometry, HIV, Diagnostic Immunology, Sexually Transmitted Diseases
Jan Silverman, Cytopathology, Gastrointestinal Pathology, Genitourinary Pathology
Harsharan K. Singh, Cytopathology, Fine Needle Aspiration Biopsy, Renal Pathology
Scott V. Smith, Surgical Pathology, Cardiovascular Pathology, Pediatric Pathology
James A. Swenberg, Chemical Carcinogenesis, Toxicology, Mass Spectroscopy, DNA Damage and Repair, Endogenous DNA Damage

Leigh B. Thorne, Molecular Pathology, Autopsy Pathology
Karen E. Weck, Molecular Genetic Pathology
Wendell Yarbrough, Otolaryngology/Head and Neck Surgery

Clinical Associate Professors
Jessica K. Booker, Genetics, Breast Cancer
Benjamin Calhoun, Breast Pathology
Georgette A. Dent, Hematopathology, Medical Education
Kevin Greene, Surgical Pathology of the Liver and Gastrointestinal Tract
Nabila Haikal, Forensic Pathology
Jonathon W. Homeister, Leukocyte Trafficking, Inflammatory Vascular Disease, Thrombosis and Hemostasis, Cardiovascular Pathology, Autopsy Pathology
Alina Iuga, Histopathology; Inflammation and Neoplastic Disorders of the Digestive System
Matthew Karafin, Transfusion Medicine
Nicole L. Korpi-Steiner, Clinical Chemistry
Stephanie P. Mathews, Hematopathology
Jason Merker, Molecular Pathology
Siobhan M. O’Connor, Breast Pathology, GYN Pathology, Cytopathology
Lori R. Scanga, Surgical Pathology, Cytopathology
Dimitri G. Trembath, Surgical Pathology and Neuropathology
Susan Weiss, Transfusion Medicine, Coagulation
Herbert C. Whinna, Mechanisms of Hemostasis and Thrombosis, Biochemistry and Vascular Biology of Blood Coagulation, Protein Structure-Function
David C. Williams Jr., Hematopathology, NMR Spectrophotometry, and Structural Biology

Clinical Assistant Professors
Kevin Alby, Clinical Microbiology
Sue Ann Berend, Cytogenetics
Sandra Bishop-Freeman, Forensic Toxicology
Christine Bookhout, Surgical Pathology
Justin Brower, Forensic Toxicology
Steven Cotten, Clinical Chemistry
Jonathan Galeotti, Hematopathology
Johann D. Hertel, Cytopathology
Kimberly Janssen, Forensic Pathology
Jayson Miedema, Dermatopathology
Nathan Montgomery, Hematopathology and Molecular Genetic Pathology
Vincent J. Moylan Jr., Cardiac Pathology and Autopsy Pathology
Craig Nelson, Forensic Pathology, Water-Related Deaths, Including Drowning of All Kinds and Particularly Scuba, Rebreather, and Free-diving Deaths
Lori Ramkissoon, Clinical Cytogenetics, Molecular Genetics
Stefanos Rentas, Molecular Diagnostics
T. Danielle Samulski, Gynecologic Pathology, ENT Pathology, and Cytology
Lauren Scott, Forensic Pathology, Preventive Health, Especially Suicide and Accident Prevention, the Value of Autopsy in Medical Education
Bart Singer, Surgical Pathology
Susan Venuti, Forensic Pathology
Eric T. Weimer, Histocompatibility, Flow Cytometry and Clinical Microbiology/Immunology
Sara E. Wobker, Genitourinary Pathology
Sam Wu, Dermatopathology

Clinical Instructors
Shelby Currier, Pathologists’ Assistant
Nicola Gerken, Pathologists’ Assistant
Steve Holmes, Examination of Simple and Complex Specimens, Surgical Pathology
April E. Kemper, Autopsy Pathology, Surgical Pathology
Andre Phelan, Pathologists’ Assistant: Surgical Pathology Training for Residents and Students

Research Professors
Frank C. Church, Thrombosis and Hemostasis, Macromolecular Protein Structure-Function, Molecular Pathology
Claire Doeschuk, Diseases Affecting the Airways of the Lung
Rosann A. Farber, Genetic Instability in Cancer, Human Molecular Genetics, Microsatellite Instability
Craig A. Fletcher, Vascular Biology
Virginia L. Godfrey, Veterinary Pathology, Animal Models of Genetic Disease, Autoimmunity
Tracy M. Heenan, Laboratory-, Exotic- and Companion-Animal Medicine
Nobuyuki Takahashi, Diabetic Nephropathy and Obesity
Shanmugam Nagarajan, Laboratory Animals as Model Systems, Molecular Evolution
Valerie Murrah, Oral, Head, and Neck Pathology
Timothy C. Nichols, General Cardiology, Cardiac Catheterization, Percutaneous Transluminal Coronary Angioplasty
Joan M. Taylor, Adhesion Signaling, Cardiovascular Disease
Melissa Trotester, Molecular Studies with Human Populations
Cyrus Vaziri, Cell Biology, Molecular Mechanisms in Hemostasis and Thrombosis
Nobuyo Maeda, Molecular Genetics of Atherosclerosis, Transgenic Laboratory Animals as Model Systems, Molecular Evolution
Reinhardt-Boris Reidel, Atherosclerosis
Shan Y. Wu, Cardiovascular and Stem Cell Biology

Research Associate Professors
Brian Cooley, Thrombosis, Vascular Injury, Microsurgery
Matthew Flick, Elucidating Mechanisms Linking Coagulation and Fibrinolytic Factors to Infectious, Malignant and Malignant Disease
Andrew Gladden, Epithelial Cell Biology; Reproductive Tract Development and Neoplasia
Jay Gula, Pediatric Gastroenterology
Peiqi Hu, Immune-Mediated Kidney Disease
Masaou Kakoki, Prevention of Cardiovascular Diseases
Jiadong Liu, Cardiovascular Biology
Stephanie A. Montgomery, Comparative Pathology and Animal Histopathology
Li Qian, Cardiovascular and Stem Cell Biology
Steven Shipley, Comparative Medicine, Infectious Disease
Young E. Whang, Androgen Receptor, Prostate Cancer
Scott Williams, Stem Cell and Developmental Biology

Research Assistant Professor
Silvio Antoniak, Protease-Activated Receptors in Cardiovascular Diseases, Myocarditis, and Heart Failure Animal Models
Pablo Ariel, Director of the Microscopy Services Laboratory
Hannah Atkins, Comparative Medicine
Xue Bai, Molecular and Functional Roles of RhoGaps in Hypertension and Metabolism Regulation
Victoria Baxter, Pathogenesis of and Host Immune Response to Infectious Disease, Particularly Encephalomyelitic Arboviruses; Animal Model Development
Jessica Bowser, Dynamics of Epithelial Integrity and Regeneration at the Interface of Inflammation and Cancer, Molecular and Biochemical Mechanisms of Endometrial Cancer Progression
Meghan Free, Nephrology and Hypertension
Natalia Isaeva, Otolaryngology
Yukako Kayashima, Atherosclerosis
Feng Li, Cardiovascular Biology
C. Tyler Long, Comparative Medicine
Sushant Patil, Bioinformatics
Reinhardt-Boris Reidel, Atherosclerosis
Allison Rogala, Comparative Medicine, Host-Microbial Interactions
Jonathan Schisler, Translational Research in Patients with Myocardial Infarcts
Morika Williams, Comparative Medicine
Yang Yang, DNA Damage and Repair
Yuchen Yang, DNA Damage and Repair

Research Instructor
Diane Armoo, Neuropathology

Adjunct Professors
Albert Baldwin, Biology
Jared Block, Hematology and Hematopathology
William B. Coleman, Breast Cancer Epigenetics, Biology of Liver Stem Cells, Hepatocarcinogenesis, Cancer Molecular Diagnostics
Peter H. Gilligan, Diagnostic Bacteriology, Pulmonary Disease in Cystic Fibrosis, Toxic Mediated Diahreal Disease
M. David Goodman, Medical Education and Autopsy Pathology
H. Michael Jones, Medical Education at Medical Student and Resident Level, Medical History, Autopsy Pathology, Research Support
William Kaufmann
Myra La-Goldman, Personalized Molecular Diagnostics
Chad A. Livasy, Surgical Pathology
Roger Lundblad, Consultant
C. Ryan Miller
Judith N. Nielsen, Animal Health Maintenance, Diagnosis and Eradication
Howard M. Reisner, Immunogenetics of Blood Coagulation, Immunochemistry
Gary J. Smith, Prostate Cancer, Cancer Cell-Tissue Microenvironmental Interaction, Angiogenesis
Richard Tidwell
Carol Weida, Cytopathology and Anatomic Pathology

Adjunct Associate Professors
Delores Grant, Cancer Research
W. Carl Jacobs, General Pathology
Thomas Lightfoot, American Red Cross Blood Services
Christopher McKinney, General Pathology
Keith Nance, General Pathology
Jay S. Raval, Transfusion Medicine
Nobuyuki Takahashi, Animal Models of Hypertension, Preeclampsia, Diabetic Nephropathy and Obesity
Adjunct Assistant Professors
Edward Bahnson, Vascular Biology, Diabetes and Metabolic Syndrome
Bal Dhungel, Lymphoproliferative Disorders
Aaron Hartman, Genitourinary and Nephropathology
Michal Kamionek, General Pathology
Emily Maambo, General Pathology
William Oliver, Forensic Pathology
Avani Pendse, Surgical Pathology
Tamiwe Tomoka, General Pathology

Professors Emeriti
Nadia Malouf Anderson
C. Robert Bagnell Jr.
Dwight Bellinger
Stuart Bentley
Debra A. Budwit
John D. Butts
John F. Chapman Jr.
Myra L. Collins
Marila Cordeiro-Stone
Robert E. Cross
Frederic G. Dalldorf
Cora-Jean S. Edgell
James D. Folds
Donald T. Forman
Joe W. Grisham
Catherine A. Hammett-Stabler
John E. Hammond
Susan T. Lord
William W. McLendon
James R. Pick
Marjorie S. Read
Harold Roberts
Kinuko I. Suzuki
Michael Topal

PATH
Advanced Undergraduate and Graduate-level Courses
PATH 426. Biology of Blood Diseases. 3 Credits.
An introduction to the biology and pathophysiology of blood and the molecular mechanisms of some human diseases: anemias; leukemias; hemorrhagic, thrombotic, and vascular disorders; and HIV disease/AIDS. Honors version available.

Rules & Requirements
Requisites: Prerequisites, BIOL 205; or BIOL 103 and BIOL 104 and BIOL 240; or permission of the instructor for students lacking the prerequisite.
Grading Status: Letter grade.
Same as: BIOL 426.

PATH 462. Experimental Pathology. 1-9 Credits.
Hours, credits, and instructor to be arranged on an individual basis. Hands-on research experience in a predetermined instructor’s laboratory. Students learn and apply specific techniques and participate in investigations of molecular mechanisms responsible for disease processes (pathobiology). Contact the director of graduate studies in pathology for information. May be repeated.

Rules & Requirements
Grading Status: Letter grade.

PATH 464. Light Microscopy. 3 Credits.
Permission of the instructor. Course focuses on practical fundamentals of light microscopy including optics, contrast mechanisms, fluorescence, laser scanning confocal microscopy, photography, and digital imaging.

Rules & Requirements
Grading Status: Letter grade.

PATH 464L. Light Microscopy Laboratory. 2 Credits.
Hours, credits, and instructor to be arranged on an individual basis. Hands-on research experience in a predetermined instructor’s laboratory. Contact the director of graduate studies in pathology for information. May be repeated.

Rules & Requirements
Grading Status: Letter grade.

Graduate-level Courses
PATH 713. Molecular and Cellular Pathophysiological Basis of Disease: Mechanisms of Disease. 3 Credits.
A graduate course on cell injury and pathogenesis of disease with emphasis on basic mechanisms at the molecular, cellular, and organismal levels. Three lecture hours with a complementary two-and-a-half-hour laboratory each week.

Rules & Requirements
Requisites: Co-requisite, PATH 714L.
Grading Status: Letter grade.

PATH 714L. Molecular and Cellular Pathophysiological Basis of Disease: Laboratory I. 2 Credits.
A graduate-level laboratory course on basic mechanisms of disease pathogenesis, emphasizing cell and tissue-based examples of major disease mechanisms.

Rules & Requirements
Requisites: Pre- or corequisite, PATH 713.
Grading Status: Letter grade.

PATH 715. Molecular and Cellular Pathophysiological Basis of Disease: Systemic Pathology. 3 Credits.
A graduate-level laboratory course on systemic pathology, emphasizing diseases of major organ systems. A follow-up to PATH 713/714L. Three lecture hours (three credits) with a complementary two-and-a-half-hour laboratory (two credits) each week.

Rules & Requirements
Requisites: Co-requisite, PATH 716L.
Grading Status: Letter grade.

PATH 716L. Molecular and Cellular Pathophysiological Basis of Disease: Laboratory II. 2 Credits.
A graduate-level laboratory course on mechanisms of systemic disease pathogenesis, emphasizing cell and tissue-based examples of diseases of the major organ systems.

Rules & Requirements
Requisites: Pre- or corequisite, PATH 715.
Grading Status: Letter grade.
PATH 723. Practical Considerations for Translational Research. 2 Credits.
Permission of the instructor. A multi-disciplinary course providing students principles involved in translating basic science into clinically applicable diagnostics and therapies to improve human disease outcomes. The course is focused on bioinformatics, bioethics, trial design, FDA approval, and commercialization of laboratory diagnostics.

Rules & Requirements
Grading Status: Letter grade.

PATH 725. Cancer Pathobiology. 3 Credits.
Permission of the instructor. This course examines pathobiological features of cancer. An interdisciplinary approach draws from epidemiology, genetics, molecular biology, and clinical medicine to investigate cancer etiology, pathogenesis, prevention, and treatment.

Rules & Requirements
Grading Status: Letter grade.

PATH 726. Human Environmental Disease. 1-3 Credits.
This course will study human disease processes that are induced or exacerbated by our environment. Environmental disease stressors include solar radiation, air and water pollution, bioreactive substances in foods, pesticides, metals, dusts, particles, and allergens. Lectures will emphasize epidemiology, mechanisms of toxicity, and human disease pathogenesis.

Rules & Requirements
Grading Status: Letter grade.

PATH 766. Current Topics in Cardiovascular Biology. 3 Credits.
Permission of the instructor. Second-year graduate students only. This manuscript-based course will emphasize recent advances in heart and blood vessel development, the molecular mechanisms that regulate cardiovascular cell function, and current methodologies in the cardiovascular field. It will be team taught by members of UNC's McAllister Heart Institute.

Rules & Requirements
Grading Status: Letter grade.

PATH 767. Molecular and Cellular Biology of Cardiovascular Diseases. 3 Credits.
Second year graduate students or permission of the instructor. Course reviews the molecular, cellular, and organismal pathogenesis of cardiovascular disease. It is team-taught by faculty with topic expertise and stresses primary literature and current methodologies. May be taken as a companion to PATH 766 or on its own.

Rules & Requirements
Grading Status: Letter grade.

PATH 770. Mouse Efficacy and Disease Models. 3 Credits.
The Mouse Efficacy and Disease Models class is designed for second to third year students who intend on performing in vivo animal research. This course is intended to familiarize graduate students in the issues associated with the development and interpretation of mouse models and also an introduction to alternative models.

Rules & Requirements
Requisites: Prerequisites, Students must be earning a degree in a Biological & Biomedical Sciences Program (BBSP) with preference given to students in the Pathobiology and Translational Science Graduate Program; students should also have selected a thesis lab prior to enrolling in this class.

Grading Status: Letter grade.

PATH 792. Seminar in Carcinogenesis. 2 Credits.
Permission of the instructor. Survey of classical and current literature on selected critical issues in carcinogenesis. Students discuss experimental methods and observations as well as theories and generalizations. Two seminar hours a week.

Rules & Requirements
Grading Status: Letter grade.

Same as: TOXC 792.

PATH 801. Cell Cycle Regulation and Cancer. 3 Credits.
This journal club-style discussion course will focus on molecular events that regulate normal cell cycle progression, and on how deregulation of the cell cycle leads to cancer. Classes will follow the development of the cell cycle field chronologically, learning how current concepts and paradigms have evolved through scientific inquiry.

Rules & Requirements
Grading Status: Letter grade.

Same as: GNET 801.

PATH 850. Scientific Writing in Pathobiology and Translational Science. 1 Credits.
The students will develop a research plan based on their thesis project and write a 6-page grant in the style of a NRSA F31 application. Students will learn to edit and critique their fellow student’s proposals which will help prepare the students for writing and editing their preliminary exam and future grant applications. Restricted to students currently earning a degree in a Biological & Biomedical Sciences Program (BBSP) with preference given to students in the Pathobiology and Translational Science Graduate Program.

Rules & Requirements
Grading Status: Letter grade.

PATH 890. Special Topics in Pathology. 1-3 Credits.
A study in special fields under the direction of the faculty. Offered as needed for presenting material not normally available.

Rules & Requirements
Repeat Rules: May be repeated for credit. 6 total credits. 3 total completions.

Grading Status: Letter grade.
**PATH 900. Research in Pathology. 2-12 Credits.**
Permission of the department. This is a research course in which advanced students in pathology carry on investigations on mechanisms of disease. Six or more laboratory hours a week, to be arranged. May be repeated.

**Rules & Requirements**
**Repeat Rules:** May be repeated for credit.
**Grading Status:** Letter grade.

**PATH 920. Seminar in Interdisciplinary Vascular Biology. 1 Credits.**
Permission of the instructor. Participants in the Interdisciplinary Vascular Biology Training Program only. Students will be required to present their thesis work as a formal seminar, give an introductory lecture to introduce their project (in cooperation with their thesis advisor), and to attend and discuss the seminars of other students.

**Rules & Requirements**
**Repeat Rules:** May be repeated for credit. 6 total credits. 6 total completions.
**Grading Status:** Letter grade.

**PATH 940. Pathobiology and Translational Science Seminar. 1 Credits.**
A series of scientific seminars by graduate students, Post-doctoral Fellows, research faculty, and others in the Department of Pathology and Laboratory Medicine. Students will develop the skills necessary to deliver an effective and engaging oral scientific presentation of their research. They will become proficient in understanding the pathogenesis of the wide range of diseases being studied in the department, and the methodologies employed to determine the pathogenesis of those diseases.

**Rules & Requirements**
**Repeat Rules:** May be repeated for credit. 7 total credits. 7 total completions.
**Grading Status:** Letter grade.

**PATH 993. Master's Research and Thesis. 3 Credits.**
May be repeated.

**Rules & Requirements**
**Repeat Rules:** May be repeated for credit.

**PATH 994. Doctoral Research and Dissertation. 3 Credits.**

**Contact Information**
**Department of Pathology and Laboratory Medicine**
Visit Program Website (http://www.med.unc.edu/pathology/)

**Director of Graduate Studies**
Andrew B. Gladden
agladden@email.unc.edu

**Student Services Manager**
Angel Truesdale
angel_truesdale@med.unc.edu

**Chair**
Russell Broaddus
rbroaddus@med.unc.edu