

Pathology and Laboratory Medicine

School of Medicine Indianapolis

Chairperson
John N. Eble*

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Departmental URL
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Graduate Faculty

(An asterisk [*] denotes membership in the University Graduate School faculty with the endorsement to direct doctoral dissertations.)

Distinguished Professor and Chancellor's Professor

Bernardino Ghetti* (Medical and Molecular Genetics, Neurobiology, Psychiatry)

Nordschow Professor of Laboratory Medicine

John N. Eble*

Clyde Culbertson Professor of Pathology

Thomas E. Davis, Jr.*

James Warren Smith Professor of Clinical Microbiology

Stephen D. Allen*

Lawrence M. Roth Professor of Pathology

Thomas M. Ulbright

Centennial Professor of Pathology

David J. Grignon*

Professors

Stephen D. Allen*, Merrill D. Benson*, Liang Cheng*, Oscar W. Cummings, Thomas E. Davis Jr.*, John N. Eble*, Kenneth Fife* (Microbiology and Immunology, Medicine), Roy Geib* (Microbiology and Immunology), Richard Gregory* (Oral Microbiology), David J. Grignon*, Dean Hawley*, Meredith Hull, Richard Kohler (Medicine), Chao-Hung Lee*, Diane Leland*, Helen E.B.

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Michael*, Bernadette F. Rodak, Lawrence Roth* (Emeritus), Kenneth W. Ryder*, Daniel S. Smith, James Smith* (Emeritus), Thomas M. Ulbright

Associate Professors

Sunil Badve*, John Baenziger, William N. Crabtree, Harvey M. Cramer*, Magdalena B. Czader*, Taihung Duong*, Robert Emerson, Eyas M. Hattab*, Raymond Lloyd Konger*, Linda Marler, Jill R. Murrell*, Carrie L. Phillips*, Romil Saxena, Ruben G. Vidal*

Assistant Professors

Jey-Hsin Chen, Rong Fan, Muhammad Idrees, Mehdi Nassiri, Kathryn Rizzo, Xiaoyan Wang

Graduate Advisor

Professor Diane Leland*, Clarian Pathology Laboratory Building, Room 6027F, (317) 491-6646.

Degrees Offered

Master of Science in Pathology and Doctor of Philosophy

Areas of Specialization

Specialization is available in various areas of anatomical, clinical, and experimental pathology. Areas of emphasis are neuropathology, experimental pathology, clinical chemistry, clinical microbiology, hematopathology, immunohematology, molecular pathology, and others. All Ph.D. degree students and M.S. degree students in the Experimental Pathology and Laboratory Science tracks choose one of these subspecialties for concentrated course work and thesis/dissertation research. M.S. students in the Pathologists' Assistant track complete courses and practical experiences involving anatomic pathology techniques.

Special Departmental Requirements

(See also general University Graduate School requirements.)

Admission Requirements

Applicants for the M.S. degree must have a bachelor's degree in clinical laboratory science (formerly medical technology), cytotechnology, microbiology, chemistry, or another biological science or have a bachelor's degree in another subject area but have completed all of the prerequisite courses for the degree track of interest. A completed application form, transcripts from all colleges attended, letters of recommendation, and scores on the Graduate Record Examination General Test must all be received before an application will be considered. A minimum grade point average of 3.0 (B) in undergraduate science courses and an interview with the graduate program

committee are required. The route of entry into Ph.D. studies in pathology is through the Indiana University School of Medicine BioMedical Gateway (IBMG) program. For IBMG information, visit www.medicine.iu.edu/~gradschl/.

Master of Science in Pathology Degree

Course Requirements

Requirements vary, according to the area of emphasis.

M.S. Degree in Pathology with Emphasis in an Area of Experimental Pathology

This course of study is recommended for students who have an interest in basic science research and plan careers as research scientists. A minimum of 30 credit hours, including completion of a graduate-level general biochemistry course with a grade of C or higher and C808 Graduate Seminar; a maximum of 2 credits of C808 can be applied toward the required 21 credit hours of course work. Most students will also take C603 General Pathology. A grade of B or higher is required in C603. At least 21 credit hours must be in courses other than research. At least 3 but not more than 9 credits must be in research.

M.S. Degree in Pathology with Special Concentration in Pathology Laboratory Sciences

This course of study is recommended for students who wish to conduct investigative work in applied laboratory science. Graduates are primed for positions involving clinical teaching, laboratory supervision, and research and development. The M.S. with special concentration in one of the subspecialty areas of clinical pathology requires at least 30 credit hours but may require up to 40 credit hours or more, depending on the area of concentration, the background of the student, and the prerequisites needed for certain advanced courses. At least 3 but not more than 9 credit hours in research, a graduate-level biochemistry course, and C808 Graduate Seminar are required; a maximum of 2 credits of C808 can be applied toward the required 21 credit hours of course work. Development of each student's curriculum of lecture and laboratory courses and of research and teaching requirements will be a joint effort of the student and the graduate advisory committee. Course work differs, depending on whether the M.S. degree is to be focused in the areas of clinical chemistry, clinical microbiology, hematology, immunohematology, or another clinical laboratory specialty area.

Thesis

Required for M.S. Experimental Pathology and Laboratory Science tracks. In special cases, published research may be substituted for the thesis. Consult the graduate advisor.

Final Examination

Oral, on the thesis.

M.S. Degree in Pathology: Pathologists' Assistant Track

This education prepares individuals to serve as pathologists'

assistants. The pathologists' assistant is a health professional, qualified by academic and practical training, who assists in providing service in anatomic pathology under the direction and supervision of a qualified anatomic pathologist. The pathologists' assistant assists in the examination, dissection, and processing of tissue samples and participates in gross autopsy dissection. Pathologists' assistants also assist with education and research in the area of anatomic pathology. This M.S. track is a 22-month program. The first year includes basic science courses in gross anatomy, histology, microbiology, and physiology. Didactic pathology techniques courses and practical experience make up the second year. Requires 40 credits: 31 course credits and 9 credits from practicum experiences.

Thesis

Not required for M.S. Pathologists' Assistant track. A thesis option is available. Consult the graduate advisor.

Doctor of Philosophy Degree in Experimental Pathology

The route of entry into Ph.D. studies is through the Indiana University School of Medicine BioMedical Gateway (IBMG) program. Admitted students take a common curriculum of didactic courses and rotate in various research laboratories. Selection of a research laboratory at the end of the first academic year determines the student's degree department. For IBMG information visit www.medicine.iu.edu/~gradschl/.

Course Requirements

A total of 90 credit hours, of which a minimum of 35 credit hours must be in courses other than research. Required courses include a graduate-level general biochemistry course, one additional graduate biochemistry or molecular biology course, C603 Pathology or equivalent, and C808; a maximum of 4 credits of C808 can be applied toward the required 40 credit hours of course work. Additional appropriate courses will be identified by the student's advisory committee and may be selected from core courses in the Department of Pathology and Laboratory Medicine or other graduate basic medical science departments. A minimum of 45 credit hours in dissertation research (C859) is required.

Grades

Overall average of at least a B (3.0). A grade of C or higher in a graduate-level general biochemistry course and a grade of B or higher in C603 Pathology are required.

Minor

At least 12 credit hours in a related discipline or in life science involving lecture/laboratory courses other than research. If a life sciences minor is approved, a minimum of 6 credit hours must be obtained in a single department.

Foreign Language

Not required.

Qualifying Examination

Written and oral, covering course work and research proposal (in form of a National Institutes of Health grant proposal).

Research Proposal

Required (in form of a National Institutes of Health grant proposal); must be approved by student's advisory committee before completion of dissertation research.

Dissertation

Required.

Courses

C603 General Pathology (6 cr.) Basic concepts and principles of disease processes.

C690 Techniques for Specimen Processing (2 cr.) P: Graduate courses in physiology, histology, and biochemistry. This course is designed for students enrolled in the M.S. in Pathology Pathologists' Assistant degree track. Didactic and laboratory experiences introduce students to specimen management and tissue processing methods. Histotechnology techniques including specimen procurement, processing, fixation, and staining are included as well as cytologic methods and electron microscopy sample processing.

C691 Gross Surgical and Pediatric Pathology Techniques (3 cr.) P: Graduate physiology, histology, biochemistry, microbiology, gross anatomy, and C690. Designed for Pathologists' Assistant students. Didactic and laboratory experiences emphasize proper handling and evaluation of tissues removed during surgery and examined in the surgical or pediatric pathology laboratory. Human embryology and medical photography and terminology are also included.

C692 Autopsy and Forensic Pathology Techniques (3 cr.) P: Graduate physiology, histology, biochemistry, microbiology, gross anatomy, C690, and C691. Designed for Pathologists' Assistant students. Didactic and laboratory experiences in autopsy and forensic pathology introduce students to all phases of the human post-mortem examination, including evisceration, dissection, description of findings, and preparation of post-mortem reports.

C693 General and Clinical Pathology (4 cr.) P: Graduate physiology, histology, biochemistry, microbiology, gross anatomy, C690, C691, and C692. Designed for Pathologists' Assistant students. Didactic and laboratory experiences introduce students to the basic concepts of pathologic processes and provide them with a working knowledge of clinical pathology testing, including chemistry, hematopathology, transfusion medicine, and microbiology.

C694 Systemic Pathology (3 cr.) P: Graduate physiology, histology, biochemistry, microbiology, gross anatomy, C690, C691, C692, and C693. Designed for Pathologists' Assistant students. Didactic and laboratory experiences in systemic pathology

provide students with a broad base of knowledge of pathologic processes in various organ systems including the nervous, pulmonary, cardiovascular, genitourinary, digestive, and musculoskeletal systems.

C695 Practicum for Pathologist Assistants (1-4 cr.) P: Graduate physiology, histology, biochemistry, microbiology, gross anatomy, C690, C691, and C692. Designed for Pathologists' Assistant students. Students complete seven to nine month-long modules involving surgical, pediatric, autopsy, and forensic pathology at various facilities. Students also study medical ethics, laboratory operations, management, and information systems, and educational techniques.

C700 Clinical Chemistry I (3 cr.) P: B500 or B800 or equivalent. Methodology, instrumentation, and interpretation with clinical correlation of procedures in the clinical chemistry laboratory.

C701 Clinical Chemistry II (2-3 cr.) P: B500 or B800 or equivalent. Special clinical chemistry therapeutic drug monitoring and radioassay, radioimmunoassay, and enzyme immunoassay.

C800 Advanced Pathology (cr. arr.) Subject material and credit hours arranged to conform to needs of student.

C802 Advanced Morphologic Hematology (2 cr.) P: Consent of instructor. A graduate-level course with emphasis on diagnostic morphologic hematology. This course covers several aspects of morphologic hematology, including erythrokinetics, myeloid and erythroid morphology, leukemia classification, myelodysplastic syndromes, myeloproliferative disorders, and newer concepts in diagnostic hematology.

C803 Diagnostic Immunopathology (2 cr.) P: Basic undergraduate immunology and permission of instructor. Emphasis on immunobiology and diagnostic immunopathology. This course covers several aspects of immunopathology including autoimmune disease, transplantation biology, immunodeficiency disorders, and use of molecular diagnostics.

C808 Graduate Seminar in Pathology (1 cr.) P: Consent of instructor. One-hour, graduate-level seminar series with emphasis on experimental pathology. First-year graduate students present critical literature reviews of contemporary research topics. More advanced students present proposals and reports of their research.

C820 Advances in Diagnostic Microbiology (3 cr.) Discussions of infectious diseases and agents of infectious diseases including source, clinical manifestations, pathogenesis, epidemiology, treatment, and prevention and control, and the correlation of these subjects with laboratory diagnostic methods. Contemporary subjects will be emphasized.

C850 Cellular Structure of the Nervous System (3 cr.) Cellular structure and ultrastructure of the C.N.S. in normal and experimental situations, including cell biology of neurons, astrocytes, oligodendroglia, brain macrophages, mast cells, brain vessels, and barriers. Organization of neural systems into global and

point-to-point circuits; generative and regressive phenomena; and cerebral transplantation in neurodegenerative conditions.

C858 Experimental Pathology (5 cr.) Review and performance of selected experiments in pathology illustrating the types of pathologic processes.

C859 Research in Pathology (cr. arr.)** Supervised initiation of a research project in pathology, and counseling in the completion of a thesis.

C862 Basic Pathologic Techniques (5 cr.) Methods of the histologic and chemical laboratories of pathology; principles of examination used in the usual procedures of surgical and autopsy pathology.

C875 Biochemical Pathology (3 cr.) P: C603 or B800. A survey of biochemical pathology as demonstrated by recent advances in research in pathology. Selected topics for lecture and discussion will include aspects of tissue, cellular, subcellular, and molecular pathology.

G556 Methods of Humane Animal Experimentation (1 cr.) The purpose of this course is to provide graduate students entering careers in life science disciplines with the opportunity to obtain training in the proper care and humane use of laboratory animals. Federal regulations and considerations in the selection of animal models will also be discussed.

G655 Research Communications Seminar (2 cr.) Study of the methodological and systematic treatments of scientific data required for effective communication through written primary and secondary research publications, oral presentations, abstracts, poster presentations, and grant proposals.

G890 Methods in Molecular Biology and Pathology (3 cr.)
P: G865 or J838, and consent of instructor. Basic principles and techniques in molecular biology and pathology. Particular emphasis will be on molecular techniques that can be used to study problems related to biochemistry and pathology.

**These courses are eligible for a deferred grade.