

# PATHOLOGY

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Courses given in Pathology have the subject code PATH. For a complete list of subject codes, see Appendix.

## PROGRAMS OF STUDY

The Department of Pathology offers advanced courses in aspects of pathology. The department does not offer advanced degrees in pathology, but qualified graduate students who are admitted to department-based or interdepartmental graduate programs may elect to pursue their thesis requirements in the department's research laboratories. The discipline of pathology has served as a bridge between the preclinical and clinical sciences and is concerned with the application of advances in the basic biological sciences, both to the diagnosis of human disease and the elucidation of the mechanisms of normal molecular, cellular, and organ structure and function that manifest themselves in clinical disease. Accordingly, the department's research interests extend from fundamental molecular biology to clinical-pathological correlations, with an emphasis on experimental oncology.

Investigation in the department includes basic studies in areas using molecular biological, biochemical, and genetic cell biological techniques: DNA replication in yeast and cultured eukaryotic cells, cell cycle control in animal cells and yeast, identification and pathogenetic role of chromosomal aberrations in human malignancies and mechanisms of activation of oncogenes in human and animal cells, lymphocyte and neutrophil-interactions with endothelial cells, cell type specification and signal transduction pathways leading to specific gene expression or modulation of cytoskeletal behavior; cytoskeletal architecture, cell-matrix interaction, developmental biology of hematopoietic stem cells and thymus, regulation of the immune system, mechanisms of immune and other responses in the central nervous

system, and neuro-degenerative diseases. In addition, a variety of studies focus on the development of novel diagnostic and immunotherapeutic treatment modalities and techniques for solid tumors, lymphomas, HIV, and genetic diseases. Research training in all of these areas is available for qualified medical and graduate students by individual arrangement with the appropriate faculty member. A summary of the research interests of the department faculty is available at <http://pathology.stanford.edu>.

## COURSES

Course and lab instruction in the Department of Pathology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at <http://www.stanford.edu/dept/DoR/rph/8-2.html>.

**PATH 101. Cancer Biology**—(Same as C BIO 101.) Experimental approaches to understanding the origins, diagnosis, and treatment of cancer. Focus on key experiments and discoveries with emphasis on genetics, molecular biology, and cell biology. Topics include carcinogens, tumor virology, oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, invasion and metastasis, cancer genomics, cancer epidemiology, and cancer therapies. Discussion sections based on primary research articles that describe key experiments in the field. Prerequisites: BIOSCI or HUMBIO core.

*4 units, Spr (Lipsick, J)*

**PATH 103Q. Leukocyte Migration**—Stanford Introductory Seminar. Preference to sophomores. How lymphocytes leave the blood stream and enter tissues to participate in immune surveillance and the development of inflammation. Cellular mechanisms involved in lymphocyte migration, including lymphocyte adhesion molecules that interact with their counter-receptors on endothelial cells, and molecules, including cytokines and chemokines, that attract or activate lymphocytes. The roles of these molecules in the development of human diseases such as asthma, type 1 diabetes, and multiple sclerosis.

*1 unit, Aut (Michie, S)*

**PATH 105Q. Final Analysis: The Autopsy as a Tool of Medical Inquiry**—Stanford Introductory Seminar. Preference to sophomores. Based on review of patient medical histories and examination of formalin-fixed and unfixed tissues from autopsy. Student-directed problem-solving; students develop learning objectives for each case, and present findings. The effect of disease on normal structure and function, ethics of patient care, allocation of medical resources, efficiency of therapy, and medical error. Prerequisite: hepatitis-B vaccination; free vaccinations during the winter for accepted students.

*3 units, Spr (Regula, D)*

**PATH 199. Undergraduate Research**—Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

*1-18 units, Aut, Win, Spr, Sum (Staff)*

**PATH 206. Epigenetics**—(Same as GENE 206.) Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. Begins with the discovery of position-effect variegation in *Drosophila* in the 1920s and proceeds to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, "histone code", variant histones, and the role of epigenetics in cancer. Open to advanced undergraduates with permission of instructor.

*2 units, Win (Lipsick, J)*

**PATH 218. Computational Analysis of Biological Images**—Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy.

*2 units, Aut (Staff)*

**PATH 233. The Biology of Small Modulatory RNAs**—(Same as GENE 233, MI 233.) Open to graduate and medical students. How recent discoveries of miRNA, RNA interference, and short interfering RNAs reveal potentially widespread gene regulatory mechanisms mediated by small modulatory RNAs during animal and plant development. Required paper proposing novel research.

*2 units, alternate years, not given this year*

**PATH 299. Directed Reading in Pathology**—Prerequisite: consent of instructor.

*1-18 units, Aut, Win, Spr, Sum (Staff)*

**PATH 399. Graduate Research**—Students undertake investigations sponsored by individual faculty members. Opportunities at the molecular, cellular, and clinicopathologic levels. Prerequisite: consent of instructor.

*1-18 units, Aut, Win, Spr, Sum (Staff)*

## COGNATE COURSE

See respective department listings for course descriptions. See degree requirements above or the program's student services office for applicability of these courses to a major or minor program.

**MI 211. Advanced Immunology I**—(Same as IMMUNOL 201.)

*3 units, Win (Chien, Y)*