

NEUROSCIENCES (NEUR)**Graduate Courses****NEUR 402. Principles of Neural Science (3)**

Lecture/discussion course covering concepts in cell and molecular neuroscience, principles of systems neuroscience as demonstrated in the somatosensory system, and fundamentals of the development of the nervous system. This course will prepare students for upper level Neuroscience courses and is also suitable for students in other programs who desire an understanding of neurosciences. Prereq: CBIO 453. Cross-listed as BIOL 402.

NEUR 405. Cellular and Molecular Neurobiology (3)

Cell biology of nerve cells, including aspects of synaptic structure physiology and chemistry. The application of molecular biological tools to questions of synaptic function will be addressed. Prereq: BIOL 473.

NEUR 408. Functional Neuroanatomy (3)

This course is designed to give students a broad appreciation of the various subdivisions, nuclear groups, and axon tracts in the human brain and spinal cord. There will not only be an emphasis on the understanding of the 3-dimensional arrangement of neuroanatomical pathways that constitute the major circuits in the CNS but also a current perspective of their functions. Lectures in this course will be a selected subgroup of those that constitute the Nervous System Committee of the 2nd year medical school curriculum. Students taking NEUR 408 will also participate in selected review session, small group conferences as well as lab, which includes a dissection of a human brain. Prereq: Consent of instructor.

NEUR 411. Neurobiology of Disease (1)

Designed to show how basic research in neuroscience has contributed to the management of clinical problems in human neurology and to discuss some of the further challenges posed by human disease for research in neurobiology. The general format will include clinical descriptions of patient presentation, discussion of the disease mechanisms and an analysis of contributions of cellular and systems neuroscience to understanding of the human disorder. Specific topics to be discussed include myasthenia gravis, dementia (including Alzheimer's disease), multiple sclerosis, Duchenne's muscular dystrophy, poliomyelitis, seizures and strokes. Prereq: NEUR 405 or NEUR 406.

NEUR 415. Neuroscience Seminars (1)

Current topics of interest in neurosciences. Students attend weekly seminars. From this series, students prepare critiques. No credit is given for less than 75% attendance.

NEUR 425. Stem Cell Biology and Therapeutics (3)

(See PATH 425.) Cross-listed as PATH 425.

NEUR 427. Neural Development (3)

Topics include cell commitment, regulation of pro-

liferation and differentiation, cell death and trophic factors, pathfinding by the outgrowing nerve fiber, synapse formation, relationships between center and periphery in development and the role of activity. Cross-listed as BIOL 427.

NEUR 432. Biochemical and Molecular Aspects of Vision (3)

Increasingly, progress in the study of visual science is requiring multidisciplinary approaches that draw from the areas of biochemistry, genetics, molecular biology, neuroscience and pathology. We have recognized this fact and have adapted this course to fit the needs of tomorrow's scientists. This course encompasses the basic science aspects of the eye. Subjects include retinal anatomy and function; biochemical, molecular aspects of retinal disease and cataract; cellular and molecular neuroscience aspects pertinent to the visual system. Cross-listed as PATH 432 and PHRM 432.

NEUR 435. Vision: Molecules to Perception (3)

The organization, physiology, and function of the vertebrate visual system are considered in detail. The visual pathway from retina to LGN and visual cortex is described with an emphasis on circuits that produce successively more complex receptive field properties. Classic papers and current literature form the basic course material. Assessment is based on student presentations, class participation, and a term paper. Prereq: NEUR 402 or consent of department.

NEUR 440. Synaptic Transmission (3)

This course will explore the basic mechanisms of synaptic transmission that operate at central and peripheral synapses. Students will read and present a mixture of historical and modern papers that established the fundamental principles of synaptic transmission and plasticity. The course will begin with a brief review of cellular neurophysiology and the techniques used to study synaptic potentials. We will then read classic papers by Katz and colleagues that defined the mechanisms controlling transmitter release at the neuromuscular junction. Next we will consider the role of calcium in regulating the release of neurotransmitters and in short-term modulation of synaptic potentials. We will then explore pre- and post-synaptic processes such as receptor saturation and vesicle dynamics that govern the amplitude and time course of post-synaptic potentials. Quantal analysis and silent synapses will be discussed in the context of the present-day controversies regarding long-term potentiation at central synapses. We will also consider the relationship between short- and long-term synaptic plasticity and behavioral functions such as learning and memory. Occasional faculty lectures will complement student presentations on primary research articles. Student grades will be based on two short (5 page) essays and class participation. Prereq: Permission of the course director.

NEUR 473. Introduction to Neurobiology (3)

(See BIOL 473.) Cross-listed as BIOL 473.

NEUR 474. Neurobiology of Behavior (3)

(See BIOL 374.) Cross-listed as BIOL 474.

NEUR 476. Neurobiology Laboratory (3)

(See BIOL 476.) Cross-listed as BIOL 476.

DEPARTMENT OF NUTRITION

School of Medicine, Room WG 48

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<http://www.case.edu/med/nutrition/home.html>

Henri Brunengraber, M.D., Ph.D., chair

Edith Lerner, Ph.D., vice chair

The department's focus is on human nutrition and the application of the science of nutrition to the maintenance and improvement of health. Undergraduate programs are designed for students interested in nutritional biochemistry and metabolism, molecular nutrition, professional study in dietetics, public health nutrition, medicine, dentistry or nursing. Graduate programs emphasize dietetics, public health nutrition, nutritional biochemistry and molecular nutrition.

The Department of Nutrition offers programs leading to the bachelor of science degree in nutrition, bachelor of arts degree in nutrition, bachelor of arts degree in nutritional biochemistry and metabolism, bachelor of science degree in nutritional biochemistry and metabolism, master of science degree in nutrition, master of science degree in public health nutrition, and doctor of philosophy degree. A nutrition minor is available. Specialty programs are available in areas such as maternal and child nutrition or gerontology. The specialty is in addition to the basic graduate degree.

Special announcements describing the various programs and providing additional information are available from the department.

UNDERGRADUATE PROGRAMS

Please see the College of Arts and Sciences section in this publication.

GRADUATE PROGRAMS (NTRN)**NTRN 433. Advanced Human Nutrition I (4)**

Emphasis on reading original research literature in energy, protein and minerals with development of critical evaluation and thinking skills. Prereq: NTRN 201 and CHEM 223 and BIOL 348 or equivalent.

NTRN 434. Advanced Human Nutrition II (3)

Emphasis on reading original research literature on vitamins with development of critical evaluation and thinking skills. Prereq: NTRN 433 or consent.

NTRN 435. Maternal and Child Nutrition (3)
Study of current research literature on nutrition for pregnancy, lactation, infancy and childhood, including assessment and requirements. Prereq: Nutrition major or consent of instructor.

NTRN 437. Evaluation of Nutrition Information for Consumers (3)
Reading and appraisal of food and nutrition literature written for the general public, including books, periodicals, and audio and visual sources. Prereq: Nutrition major and graduate standing or consent of instructor.

NTRN 438. Trends in Diet Therapy (3)
Evaluation and interpretation of modern concepts of nutrition related to abnormalities requiring dietary modifications. Prereq: NTRN 365 or equivalent.

NTRN 440. Nutrition for the Aging and Aged (3)
Consideration of the processes of aging and needs which continue throughout life. The influences of food availability, intake, economics, culture, physical and social conditions and chronic disease as they affect the ability of the aged to cope with living situations. Prereq: Nutrition major or consent of instructor.

NTRN 446. Advanced Maternal Nutrition: Special Topics (3)
Analysis of the problems commonly associated with high-risk pregnancies and fetal outcome. Discussion of causes, mechanisms, management and current research. Prereq: NTRN 435 or consent.

NTRN 451. Food Service Systems Management (3)
Application of organizational theory and skills in the preparation and service of quantity food. Laboratory experiences in professional food services are included. Students will analyze one aspect of food service management in depth. Prereq: Nutrition Major or consent.

NTRN 452. Nutritional Biochemistry and Metabolism (3)
Mechanisms of regulation of pathways of intermediary metabolism; amplification of biochemical signals; substrate cycling and use of radioactive and stable isotopes to measure metabolic rates. Prereq: BIOC 307 or equivalent. Cross-listed as BIOC 452.

NTRN 454. Isotope Tracer Methodology (3)
Stable and radioactive isotopes in metabolic research concentrating on the design of in-vitro and in-vivo investigative protocols using mostly stable isotopes and mass spectrometric analysis; critical interpretation of data from the recent literature; and pathway identification and kinetics. Prereq: BIOC 407.

NTRN 455. Molecular Nutrition (3)
Nutrient control of gene expression in mammalian cells and deregulation of expression of these genes. The molecular basis of nutrition-related diseases,

such as diabetes mellitus, PKU, and LDL-receptor deficiency, will be discussed. The application of genetic manipulation to metabolism and nutrition will be evaluated. Prereq: BIOC 407.

NTRN 460. Sports Nutrition (3)
Study of the relationships of nutrition and food intake to body composition and human performance. Laboratory sessions include demonstrations of body composition and fitness measurements and participation in a research project. Prereq: NTRN 363 or NTRN 433 or consent.

NTRN 516. Seminar in Dietetics I (4)
Study of scientific basis for clinical and community nutrition practice and developments in food service systems management. Prereq: Dietetic internship.

NTRN 517. Seminar in Dietetics II (4)
Study of scientific basis for clinical and community nutrition practice and developments in food service systems management. Prereq: Dietetic internship.

NTRN 528. Introduction to Public Health Nutrition (3)
Philosophy, objectives, organization, and focus of government and voluntary agencies with emphasis on nutrition components. Prereq: Public health nutrition majors only.

NTRN 529. Nutritional Epidemiology (3)
This course uses epidemiology as a tool for assessing potential causal associations between dietary excesses, deficiencies and imbalances to the prevalent chronic diseases. It addresses the epidemiologic aspects of nutrition related chronic diseases, for example, the multi-factorial nature of etiology. Prereq: Statistics and Public Health Nutrition students only.

NTRN 530. Public Health Nutrition (3)
Analysis of public health programs in government and voluntary health agencies and the effect of legislation. Emphasis on integration with other disciplines working in public health settings and the role of a public health nutritionist. Prereq: Consent of instructor.

NTRN 531. Public Health Nutrition Field Experience (1-6)
Individually planned public health experience. May be concurrent with course work in local agencies or in blocks of full-time work with a city, county, or state health agency. Prereq: Open to public health nutrition students only. Consent of instructor.

NTRN 532A. General Nutrition Care (1-3)
Individually arranged clinical experience.

NTRN 532C. Specialized Public Health Nutrition Field Experience (1-3)
Individually arranged clinical experience. Prereq: Public Health Nutrition students only. Consent of instructor.

NTRN 532D. Hospital Dietetics (1-3)
Individually arranged clinical experience.

NTRN 532E. Clinical Research: Methods in Nutrition and Metabolism (3)
Individually arranged.

NTRN 533. Nutritional Care of Neonate (3)
Nutritional assessment and management of high-risk newborns with emphasis on prematurity and low birth weight. Review of current literature coordinated with clinical experience in the neonatal intensive care unit. Issues on follow-up included. Prereq: NTRN 435 or consent.

NTRN 534. Advanced Public Health Nutrition Field Experience (1)
Individually planned advanced public health experience. Prereq: Open to public health nutrition students only.

NTRN 550A. Advanced Community Nutrition (3)
Development of skills needed by the community dietitian. Emphasis on effective tools for service development and delivery. Recommended courses of action for the professional.

NTRN 550B. Seminar: Dietetics (1)

NTRN 551. Seminar in Advanced Nutrition (2-3)

NTRN 561. Investigative Methods in Nutrition (1-4)
Research methods appropriate for nutrition. Methods for conducting research in nutrition and food sciences, food service management and dietetics. Designing research proposals. Prereq: Nutrition major or consent of instructor.

NTRN 601. Special Problems (1-18)

NTRN 651. Thesis M.S. (1-18)

NTRN 701. Dissertation Ph.D. (1-18)

NTRN 703. Dissertation Fellowship (1-8)

Master of Science Degree in Nutrition
This degree program offers two options. For those pursuing the thesis option, 30 semester hours of a planned program of study are required, including six to nine semester hours of research, as well as a final oral defense of the thesis. The non-thesis option requires 30 semester hours and a final written, comprehensive examination.

All candidates are required to take 15 semester hours of nutrition, including six hours of advanced human nutrition. In addition, students are encouraged to pursue complementary studies in the biomedical, social and behavioral sciences. The plan of study may vary considerably depending on the education, goals and specific

interests of each student. Students may elect to focus on nutritional biochemistry and metabolism, and molecular nutrition. The individual program also may be planned to fulfill the academic requirements for dietetic registration (Didactic Program in Dietetics).

Master of Science Degree in Public Health Nutrition/Internship

The primary goal of this program is to prepare nutrition specialists to function in public health/community agencies. A minimum of 30 semester hours of combined academic work and field experience is required to earn the degree. Course work focuses on human nutrition, dietetics, and the public health sciences. Field experience is concurrent with course work utilizing local community agencies for direct application of theory to practice. The final phase of the program is an eight-week, full-time experience with a public health agency that has a strong nutrition component. The student works closely with an adviser throughout the program, on an individual basis.

In addition to the general public health program, students may elect to specialize in maternal and child nutrition or gerontology. The gerontology specialty is certified through the Center on Aging and Health located on campus. Each specialty requires additional semester hours of academic work. A portion of the field experience is specified for either population group.

For students wishing to become eligible to take the registered dietitian (R.D.) examination, the program also currently is granted accreditation by the Commission on Accreditation for Dietetics Education (CADE) of the American Dietetic Association as an internship. CADE is a specialized accrediting body recognized by the Commission on Recognition of Post-secondary Accreditation and the United States Department of Education.

Coordinated Dietetic Internship/Master's Degree Program

The Coordinated Dietetic Internship/Master's Degree Program combines academic work with clinical practice at either of the dietetic internships at University Hospitals of Cleveland or the Louis Stokes Cleveland Department of Veterans Affairs Medical Center. A minimum of 27 semester hours is required. Admission is contingent on the student's being selected and matched to one of the hospitals. Appointment to these internships follows the

admission procedure outlined by the Commission on Accreditation for Dietetics Education of the American Dietetic Association. Contact the Department of Nutrition for information regarding application.

Doctor of Philosophy Degree in Nutrition

The Doctor of Philosophy degree in nutrition is awarded for study and research in nutrition. Areas of concentration are nutritional biochemistry and metabolism, and molecular nutrition.

Additional information about graduate degree programs may be obtained from the department.

DEPARTMENT OF PATHOLOGY

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The clinical, research, and educational activities of the Case Department of Pathology are located in several primary locations. Four are situated in University Circle, the cultural center of Northeast Ohio, located minutes from the heart of downtown Cleveland. These four include the Basic Science component of the department at Case School of Medicine, the Clinical Services component of the department at University Hospitals of Cleveland, the Cuyahoga County Coroner's Office, and the Veteran's Administration Hospital. Research laboratories of the department are located in the Wolstein Research Building (completed in 2003), and in the Institute of Pathology. Both are situated adjacent to University Hospitals of Cleveland, the primary teaching hospital of the Case School of Medicine and the location of the department's Pathology Residency Program. Affiliations with educational and research relevance include the Pathology Department at MetroHealth Medical Center in downtown Cleveland. Also close by are several outstanding libraries, including the Health Science Library, the Allen Memorial Medical Library, the Kelvin Smith Library, and the department's own library.

World class research is conducted in the department in biomaterials biocompatibility, cancer biology, immunology, neurobiology, outcomes research, and tissue injury and heal-

ing. The department's research activities are characterized by highly cooperative and collaborative interactions within the department, and the Case community. In 2005, the department's annual NIH research support totaled \$ 10,783,617, placing the Department of Pathology twentieth nationally, amongst ninety-five medical school pathology departments. For information about graduate programs, please see http://www.case.edu/med/pathology/grad_prog/gradprogrmenu.htm.

GRADUATE COURSES (PATH)

PATH 390. Undergraduate Research in Cancer Biology, Immunology, or Pathology (1-3)

Students undertake a research project directly related to ongoing research in the investigator's/instructor's laboratory. Written proposal outlining research topic, a schedule of meetings and format and length of final written report to be prepared prior to registration for credit. Prereq: One year of college chemistry and consent of instructor.

PATH 395. Selected Readings in Immunology, Cancer Biology, or Pathology (1-3)

Relevant readings and literature search on particular immunology, cancer biology or pathology topic(s) chosen by the student and directed by the instructor. Written proposal outlining chosen topic, type of work to be done, a schedule of meetings and format and length of final written report to be prepared prior to registration for credit. Prereq: Consent of instructor.

PATH 410. Aging and the Nervous System (1)

Lectures and discussion on aspects of neurobiology of aging in model systems; current research on Alzheimer's, Parkinson's, and Huntington's diseases. Prereq: Consent of instructor.

PATH 412. Theories of Aging and Longevity (1)

Insight into current theories of aging of molecules, cells, extracellular elements and their relationship to lifespan in human beings and other vertebrates. Lecture/journal club format. Prereq: Consent of instructor.

PATH 415. Cytoskeleton and Disease (1)

Discussion of recent papers that have added to knowledge of normal cytoskeletal functions and their alterations in disease. Prereq: Consent of instructor.

PATH 416. Fundamental Immunology (3)

Introductory immunology providing an overview of the immune system, including activation, effector mechanisms, and regulation. Topics include antigen-antibody reactions, immunologically important cell surface receptors, cell-cell interactions, cell-mediated immunity and basic molecular biology of B and T lymphocytes. Lectures emphasize experimental findings leading to the concepts of modern immunology. Prereq: BIOL 210 or BIOL