OPHTHALMOLOGY

OPH 1. Anatomy, Physiology and Pathology of the Eye. 1 Credit Hour.
This course introduces the major anatomical and physiological regions of the eye, including cornea, lens, retina, optic nerve, cranial nerves and extracranial tissues. Emphasis is placed on the relationship between the eye and other systems. Additionally, the major pathologies associated with each region of the eye, and their major diagnostic and prognostic features, will be discussed in detail. Demonstrations include eye dissection, visual testing and visual perception experimentation.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

OPH 2. Pathophysiology of Eye Diseases. 1 Credit Hour.
This course covers in detail the major pathologies of the eye, including congenital diseases and syndromes, infectious diseases, tumors and adult-onset degenerations. Emphasis is placed on pathophysiological mechanisms contributing to pathology, and also covers examination of the eye, diagnostic features, and management of major eye diseases. Demonstrations include histological sections, OCT, visual field and angiogram, and associated diagnostic criteria.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

OPH 3. Ocular Pharmacology, Epidemiology & Biostatistics. 1 Credit Hour.
Course will teach local anesthetics, anti-infectious, anti-allergic agents, control of ocular pain, adverse ocular and systemic reactions caused by therapeutic agents will be part of the course. Ocular therapeutic principles (pharmacokinetics and pharmacodynamics, toxicity), sources of drug information, new drug development, drug regulations as applicable to different areas of operation including prescription writing will be discussed. An introductory course in epidemiologic and biostatistics methodology covering study design for investigation of both infectious and chronic diseases of the eye; screening programs and health services research will also be discussed. Outbreak investigation, natural history of infectious diseases, validity of clinical tests, survival analysis, and clinical trial and etiologic studies will be discussed. Methods of biostatistician evaluation of experiment design and analyses of data to decipher significant from non-significant results and general tools for statistical analyses will be reviewed.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

OPH 4. Microbiology and Immunology of the Eye. 1 Credit Hour.
Students will learn concepts and terminologies of immunology, bacteriology, virology, parasitology and mycology with an emphasis on mechanisms of microbial disease transmission and host defense mechanisms. Students become familiar with the types of organisms responsible for human disease, the mechanisms by which they produce disease, and the application of this knowledge to the treatment of patients. This course integrates the biomedical disciplines of immunology and medical microbiology. Infectious and immunological diseases with relevance to the clinical setting and pharmacological approaches will be presented. A basic understanding of the classification and characteristics of infectious microorganisms, the mechanisms by which infectious agents cause disease, and methods of both prevention and treatment are highlighted. Causes and treatment of immune diseases will also be presented. Concepts of inflammation, sepsis, cell injury, tissue repair, hemodynamic disorders, genetic disorders, environmental and nutritional pathology, immunodeficiency diseases, autoimmune and metabolic diseases will be presented. Throughout the course, small group tutorials and interactive clinical correlations based on clinical cases linking basic science concepts to clinical medicine will be presented. Tutorials, clinicopathological correlations and laboratories emphasize problem-solving skills, integration of knowledge and independent learning.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

OPH 5. Elective Course by Selective Offering or Remedial Courses. 2 Credit Hours.
Seminars on different aspects of medicine including a broad spectrum view of career options. The emphasis will be how medicine has been developed historically, its efficacy, and the future outlook. For example, antibiotic resistant bacteria was discovered in 12,000 year old underground caves that makes us realize that antibiotic resistance is an old problem and we need to have an outlook bearing that in mind.
Components: LEC.
Grading: GRD.
Typically Offered: Summer.

OPH 6. Ocular Pharmacology and Therapeutics. 5 Credit Hours.
Course will teach local anesthetics, anti-infectious, anti-allergic agents, control of ocular pain, adverse ocular and systemic reactions caused by therapeutic agents will be part of the course. Ocular therapeutic principles (pharmacokinetics and pharmacodynamics, toxicity), sources of drug information, new drug development, drug regulations as applicable to different areas of operation including prescription writing will be discussed. An introductory course in epidemiologic and biostatistics methodology covering study design for investigation of both infectious and chronic diseases of the eye; screening programs and health services research will also be discussed. Outbreak investigation, natural history of infectious diseases, validity of clinical tests, survival analysis, and clinical trial and etiologic studies will be discussed. Methods of biostatistician evaluation of experiment design and analyses of data to decipher significant from non-significant results and general tools for statistical analyses will be reviewed.
OPH 7. Ophthalmic Genetics. 1 Credit Hour.
This course provides an overview of the influence of genetics in ophthalmology with respect to understanding pathogenic mechanisms of eye diseases, and the development of novel therapeutic strategies. The course will provide an introduction to complex and Mendelian genetics, and research strategies involved in identifying disease-associated genetic changes. Specific topics include hereditary retinal diseases, genetic associations in age-related macular degeneration and glaucoma, genetics of myopia and optic nerve diseases, and mitochondrial disorders affecting the eye. Additional discussions include current gene therapy clinical trials.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

OPH 790. Thesis. 1-7 Credit Hours.
This course will entail bench research or research with a clinician on data analytics under the supervision of a faculty or a team of faculty members, wherein one faculty will be the recorded mentor. The students will conduct research and produce a thesis and also write and submit a manuscript in a peer-reviewed journal.
Components: THE.
Grading: CNC.

Typically Offered: Fall.

OPH 8. Electrophysiology of the eye. 1 Credit Hour.
This course will introduce the basic principles of electrophysiology of the eye, identify neural signals, neurotransmitters, molecular signaling within neurons. Additionally, the sensation and sensory systems. Emphasis is placed on the relationship between the eye and other signals and senses. The course will be divided into three parts (two units) to include basic principles; electrophysiology in experimental eye research: single cells, field potentials; and translational electrophysiology: ERG, VEP. Unit 1 will focus on “Neuro Signaling” and Unit 2 will focus on “Sensation and Sensory Processing”.
Co-Requisite: OPHL 3.
Components: LEC.
Grading: GRD.

Typically Offered: Spring.

OPH 9. Vision and Optics. 2 Credit Hours.
This course will provide an introduction to the principles of geometrical optics and its application to the study and assessment of the visual system. Topics covered will include fundamental of geometrical optics, principles of optical system components (lenses, mirrors, prisms, light sources), optics of the eye and vision correction, basic principles of visual optical instruments (loupe, microscopes, telescopes), and principles and applications of ophthalmic diagnostic and imaging systems, including ophthalmoscopes, retinoscopes, slit-lamp, keratometers, corneal topography systems, aberrometers and optical coherence tomography.
Co-Requisite: OPHL 2.
Components: LEC.
Grading: GRD.

Typically Offered: Spring.

OPH L1. Lab 1: Basic Biochemistry, Microbiology, and Pathology. 3 Credit Hours.
Experiments related to molecular biology (includes PCR, DNA cloning, hybridization analysis, restriction mapping, and DNA sequence analysis), protein purification and analysis (salt fractionation, ion exchange chromatography, affinity chromatography, SDS-PAGE, and immunoblotting), and determination of enzyme kinetic parameters.
Components: LAB.
Grading: GRD.

Typically Offered: Fall.

OPH L2. Lab 2: Basic and Applied Optics and Statistics. 1 Credit Hour.
This laboratory course serves as a companion to the Vision and Optics course. It will include practical hands-on examples of the application of geometrical optical theory to the design and calculation of optical systems, provide an initial hands-on experience with basic optical system setup on an optical bench, and provide basic hands-on training or demonstration of ophthalmic diagnostic techniques and instruments, including refraction, ophthalmoscopy, retinoscopy, slit-lamp examination, aberrometry, corneal topography and optical coherence tomography.
Co-Requisite: OPH9.
Components: LAB.
Grading: GRD.

Typically Offered: Spring.

OPH L3. Lab 3: Electrophysiology, Clinical Testing and Applications. 1 Credit Hour.
This course/lab work will introduce the students to novel clinical recording techniques, electrophysiology tests, and clinical application of ERG, EOG, and VEP. Emphasis is placed on novel and specialized clinical applications and recordings. The course will be divided into two sections. Section one ends with focus on the effects of maturation, aging, and testing in infants. Section two will conclude with electrophysiologic findings of many clinical conditions and clinical applications of ERG, EOG, and VEP of various eye disorders/diseases.
Co-Requisite: OPH 8.
Components: LAB.
Grading: GRD.

Typically Offered: Spring.

OPH PBL1. Advanced and High Throughput Approaches in Science. 2 Credit Hours.
The Problem-Based Learning Method (PBL) will be used to teach students in small groups to identify specific techniques that will yield the answers to the problems. Content will include the underlying norms and principles that shaped these concepts. The courses also include plenary session presentations by experts on relevant topics and their use in preparing manuscripts and grant applications and policies regarding conduct of experiments using these techniques.
Components: ENS.
Grading: GRD.

Typically Offered: Fall.
OPH PBL2. PBL2: Management skills and Tools for Academia and Enterprises. 2 Credit Hours.
This course will introduce grant writing, pre-award preparation, post-award management and will be taught using problem-based modules. Federal and non-federal extramural grants will be used as modules specific aspects of different segmental grants will be presented. Major research grant, training and fellowships, grants-in-aid will be taught. In addition, small business innovation research (SBIR) or STTR will be covered. Students will learn techniques to analyze markets, identify optimal opportunities, develop plans to sell their vision in order to attract and stakeholders. A series of problem-based lecture integrates modern business concepts from an entrepreneurial approach.
Components: ENS.
Grading: GRD.
Typically Offered: Spring.

OPH PBL3. PBL3: Animal models, Regulatory issues and Research methods. 2 Credit Hours.
The aim of this course is to provide students the basic understanding and expertise pertaining to generation and implementation of preclinical research IACUC protocol. This course consists of a problem based learning module with a focus on developing students’ understanding of various animal models in preclinical research and how to refine animal research models that meet the requirement of IACUC regulation. In addition, this course will provide clinical research regulatory expertise with an aim to create future leaders in the drug development industry. This regulatory science course uses a multidisciplinary approach and encompasses course work in regulatory writing techniques, quality systems, and medical device and pharmaceutical regulation. The concentration is designed to develop the student’s understanding of how to meet regulatory oversight requirements as they relate to the conduct of clinical studies. This course will prepare students to play critical roles throughout the lifecycle of pharmaceuticals, medical devices, and biologics. They provide strategic, tactical and operational direction, and support for working within regulations to expedite the development and delivery of safe and effective healthcare products to individuals around the world. The regulatory professional’s services can be utilized in research and development, clinical trials, extension of premarket approvals, manufacturing, labeling and advertising, and post-market surveillance. Knowledge of clinical research conduct and management which involves the design, execution and management of clinical trials as well as quality assurance and compliance principles are important to regulatory professionals. Course also provides highlight on how to effectively partner with experts such as writers drafting pre- and post-approval regulatory FDA submission documentation (INDs, NDAs, PMAs etc.) for product clearance or licensure, IRB reviewers and investigational Pharmacists to enhance the development of healthcare products.
Components: ENS.
Grading: GRD.
Typically Offered: Spring.