

**Curriculum of M. Phil Leading to  
PhD Program**

**in**

**Vision Sciences  
(Optometry)**



**2011**

**King Edward Medical University**

**Lahore Pakistan**

## INTRODUCTION

College of Ophthalmology and Allied Vision Sciences (COAVS), King Edward Medical University/Mayo hospital Lahore Pakistan is committed to train Human Resource in different disciplines of ophthalmology to provide quality eye care services at all levels of health care, primary, secondary and tertiary.

Delivery of comprehensive eye care services can only be ensured if an ophthalmic team comprising of Ophthalmologist, Optometrist, Orthoptist, Ophthalmic technologist, Refractionist, Ophthalmic technician , Ophthalmic nurse for teaching level, Ophthalmologist, Refractionist and Ophthalmic Technician for secondary and sub secondary level, work at the desired level.

COAVS is running B.Sc Hons Vision Sciences program for Optometry, Orthoptics & Ophthalmic Technology/Investigative ophthalmology since 2004. Competent and efficient Optometrist, Orthoptists & Ophthalmic technologists of international standard have been produced during the last 04 years and they all are working as member of Ophthalmic teams at different levels of health care. The need has arisen to start research in different disciplines of Vision Sciences and produce research Scholars/supervisors/teachers in these fields as well. Considering the needs, COAVS has developed curricula for M.Phil leading to Ph.D Program in Vision Sciences in the disciplines of Optometry, Orthoptics & Ophthalmic Technology/Investigative ophthalmology The programs developed are in line with the program being run at King Edward Medical University Lahore, Pakistan.

Once started and quality scholars are produced, the discipline of Vision Sciences will reach the level of excellence in Pakistan and will prove a mile stone in the efforts to deliver quality eye care service to people at their doorsteps.

# **M.PHIL Vision Science PROGRAM FACULTY**

## **PROGRAM DIRECTOR**

Professor Dr. Asad Aslam Khan (SI)

## **REGULAR FACULTY**

Prof. Dr. Asad Aslam Khan

Prof. Tehseen Sahi

Prof. Mumtaz Hassan

Dr. Amtul Naseer

Dr. Raza Ali Shah

Dr. Ashal Pal

Dr. Suhail Sarwar

Dr. Qasim Latif

Dr. Junaid Afzal

Dr. Nasir Ch

Dr. Javed Ch

Dr. M. Ramzan

## **VISITING FACULTY**

Faculty from Alder Hey Children Hospital, Liverpool UK

Faculty from Vision 4 Children, UK

Faculty from EyeLearn, UK

Dr. M. Ajmal Ch, Nishtar Medical College, Multan

Dr. Majid Hussain, Nishtar Medical College, Multan

Dr. Khalid, Quaid e Azam Medical College, Bahawalpur

Dr. Sarfraz, Punjab Medical College, Faisalabad

## **Program Outline**

The program of "Mphil leading to PhD" in subject of vision sciences (Optometry) has been developed in the light of frame work (rules & regulations) approved by the syndicate of KEMU and notified as version II, 2011.

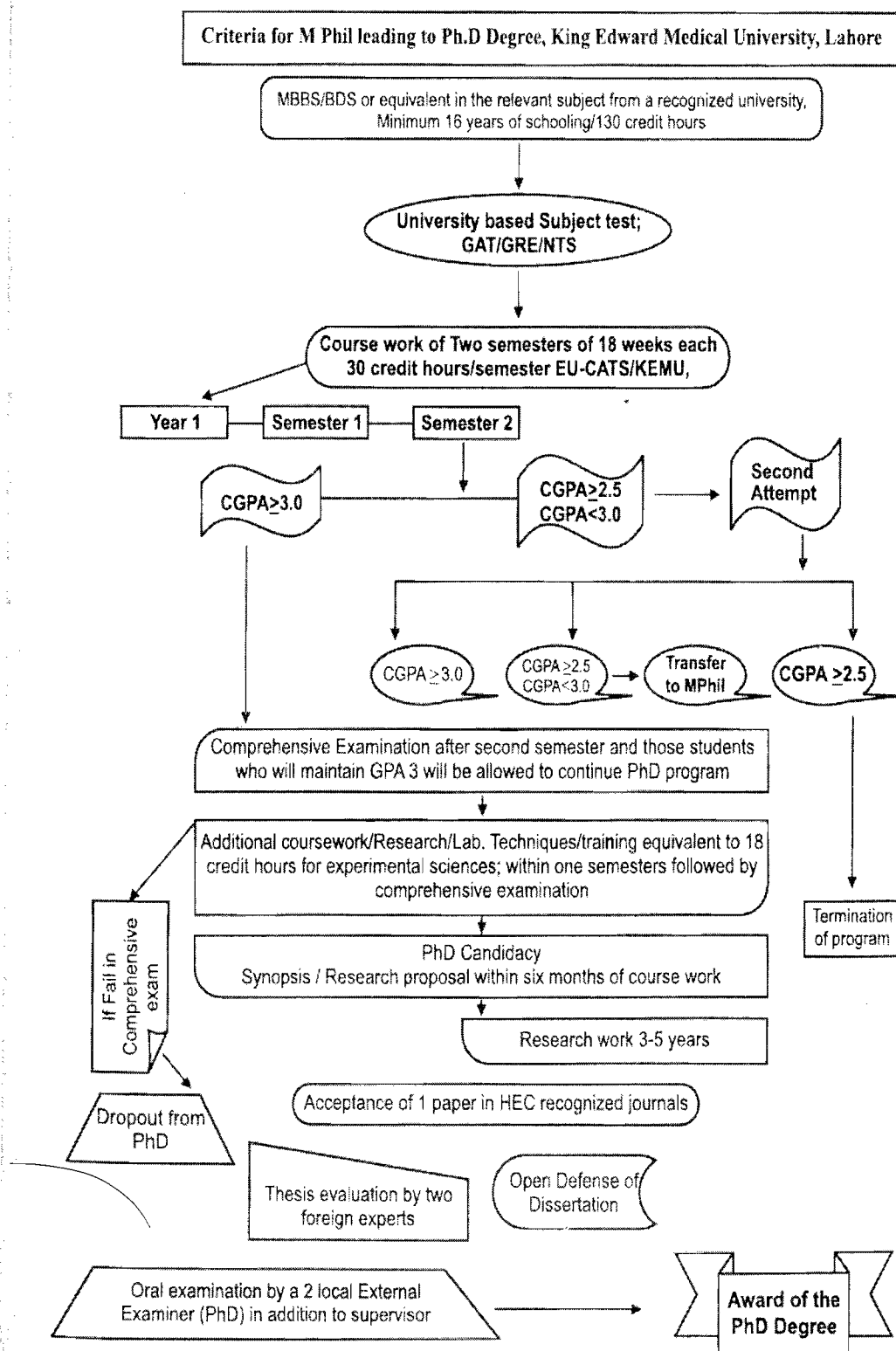
## Program Outline

<b>Duration of the Program:</b>	05 Years (Full Time)
<b>Entry Qualifications:</b>	BS.c (Hons) Vision Sciences (Optometry) or Equivalent Qualification with minimum 16 Years of education
<b>Entry Procedure:</b>	GRE Type OR Subject Test (MCQ Based) Written Test. Interview at Department of the Program Level

### Scheme of the program

<b>Entry Test</b>			
<b>Year 1</b>	<b>Semester 1 Taught courses +Evaluation (20 Weeks ) 30 CRH</b>	<b>Semester 2 Taught courses +Evaluation (20 Weeks) 30 CRH</b>	<b>Comprehensive Examination</b>
<b>Year 2</b>	<b>Semester 3 Research Project (Synopsis within 6 month of Passing Comprehensive examination)</b>	<b>Semester 4 Research Work</b>	
<b>Year 3</b>	<b>Research Work</b>		
<b>Year 4-5</b>	<b>Research Work</b>	<b>Thesis writing +Submission</b>	
<b>Defense of Thesis</b>			

### ANNEX-1-a



## Year 1 Semester 1

### Class Schedule

	701	702	703	704	705	706
<b>Duration</b>	2 weeks 3-CR	3 weeks 4.5-CR	2 weeks 3-CR	3 weeks 4.5-CR	5 weeks 7.5-CR	5 weeks 7.5-CR
<b>Title of Module</b>	Introduction to Vision Sciences	Research Methods & Biostatistics	Molecular Biology & Genetics	Basic Science	General Pathology	Neurophysiology of Vision & Neuro-Ophthalmology
<b>Module Coordinator</b>	Prof. Dr. Asad Aslam Khan	Prof Dr Mulazim Hussain Bukhari Dr Kanwal Saba	Prof. Fridoon	Antaomy, Physiology & Pathology Department of K.E.M.U	Prof Dr Mulazim Hussain Bukhari	Dr Ashal Pal Faculty from Alder Hey Children Hospital,UK Vision 4 Children, UK Eyelearn, UK
<b>Place of Learning</b>	COAVS	Patiala Block	Patiala Block	Department Lecture Room	Department Lecture Room	COAVS

# Year 1 Semester 1

## Weekly Schedule

Days	8am-9am	9am-10am	10am-11am	11am-Noon	Noon-1pm	1pm-4pm
Monday					LUNCH	
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday				Self Directed Learning/ Guided Library Hours	LUNCH	

**Total No of hours in semester** **720**

Theory Lectures hours/weeks	<input type="text"/>	18
Laboratory hours/weeks		12
Seminars and Assignments/weeks		06
Self learning hours/weeks		04

**Total hours/Week** **40**

Theory	70%
Practical	30%



# Semester I

## Module 701

2 weeks

3 Credit Hours

## **Introduction to Vision Sciences**

### Course Description and Learning Objectives

In this subject students will build on concepts presented on Ocular Genetics, Ocular Biochemistry. It will also cover advanced studies in visual science, especially visual psychophysics, visual neurophysiology and neuroimaging, and aims to give a good understanding of current ideas about visual function and visual mechanisms, with some discussion of their connections to clinical and/or industrial practice in optometry. The module will describe some of the fundamental science at a fairly advanced level, along with clinical studies on spatial vision, temporal vision, binocular vision, neuroimaging techniques and their application to amblyopia, human peripheral vision, the role of M and P cells and how this relates to clinical studies on glaucoma, and the role of attention in vision.

### Course Contents

- Signal detection theory & psychophysics
- Spatial vision & feature coding
- Temporal vision & motion perception
- Masking and suppression
- Binocular interactions
- Crowding and summation
- Neuroimaging techniques: essential theory & methodology
- Neuroimaging in human amblyopia
- Human peripheral vision: role of M & P cells
- Role of attention in vision

### **Clinical Attachment**

In concerned Departments and Rooms

## Seminars

Will be conducted on related topics

## Self Learning

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

## Books Recommended

- Text Book of Visual Science and Clinical Optometry  
Edited by: Bikas Bhattacharyya

### Module 702

3 Weeks

4.5 Credit Hours

## Research Methods & Biostatistics

### Course Description and Learning Objectives:

- To help participants to formulate ideas that can be tested in a scientific manner
- To give participants a basic understanding of epidemiological methods and biostatistics.
- To develop the critical faculties of participants for evaluation of their own and other people's work.
- To give practical experience of development of study protocols and applications for research funding.
- To give practical experience of use of computers for word processing, database manipulation, use of spreadsheets, statistical analysis, preparation of slides and overheads, internet communication and video conferencing and report writing.

### Course Contents:

1. Research Methods
  - Philosophy, language, types and structure of Research
  - Conceptualizing research, problem formulation, research objectives

- Review of literature, sources of knowledge
  - The Planning-Evaluation Cycle
  - Sampling terminology, Probability sampling, Non-probability sampling, Bias and Error
  - Time in Research, Types of Relationships
  - Variables, Hypotheses, Types of Data
  - Introduction to Design, Types of Designs
  - Experimental Design
  - Survey Research, Types of Surveys
  - Qualitative research, Qualitative Data
  - Introduction to Design, Types of Designs, Experimental Design
  - Questionnaires
2. Biostatistics
- Data display and summary, mean and standard deviation
  - Populations and samples
  - Statements of probability and confidence intervals
  - Differences between means: type I and type II errors and power
  - Differences between percentages and paired alternatives
  - The t tests and the chi-squared tests
  - Correlation and regression
  - Study design and choosing a statistical test
3. Epidemiology
- What is epidemiology?
  - Quantifying disease in populations
  - Comparing disease rates
  - Measurement error and bias
  - Planning and conducting a survey
  - Ecological studies, Longitudinal studies, Case-control, cross sectional studies and experimental studies
4. Technical Writing
- Synopsis writing
  - Grant proposal writing
  - Research paper writing
  - Thesis outline
  - Thesis writing

**Module 703**

**2 Weeks**

**3 Credit Points**

## Molecular Cell Biology

### Course Description and Learning Objectives:

- This course is the second in the series of two courses designed to introduce both classical and contemporary topics in biology to the students.
- This course is structured to entertain students irrespective of their major.
- After taking this course students will be expected to have a basic understanding of the following fundamental concepts
  1. The role of cellular and molecular biology in medicine.
  2. Immunology.
  3. Molecular and cellular developmental biology (“miracle of life” formation of a complex organism from a single cell).
  4. Evolution with a molecular perspective (natural force and their effect in transformation of life).

**Course Contents:**

1. Recombinant DNA and Biotechnology
2. Molecular Biology and Medicine
3. Natural Defenses against Disease
4. Differential Gene Expression in Development
5. Animal Development: From Genes to Organism
6. Development and Evolutionary Change
7. The History of Life on Earth
8. The Mechanisms of Evolution
9. Species and Their Formation
10. Reconstructing and Using Phylogenies
11. Molecular and Genomic Evolution

**Book Recommended:**

1. Life, ‘The Science of Biology’ by Craig Heller

**Module 704****3 Weeks****4.5 Credit Hours****Basic Science**

## Course Description and Learning Objectives:

- This is a multidisciplinary course that in two weeks gives students basic knowledge of the five pillars of basic medical sciences i.e. Anatomy Physiology Pathology Biochemistry And Course Pharmacology.
- Student taking this course will be able to understand

## Course Contents:

### Anatomy

1. Embryology
  - Fertilization, Zygote, Morula, Blastula, Gastrula, Embryonic period Derivatives of germ layers
  - Brief account of Amnion, Chorion, Placenta
  - Out line of development of Heart and its Anomalies
  - Brief account of development of Urogenital, Digestive systems
2. Histology
  - Cell,
  - Tissue (Epithelial tissue, Muscular tissue, Connective tissue and Nervous tissue)
  - General plan of microscopic structure of CVS
  - Systems (Respiratory, Urogenital, Digestive systems)
3. General Anatomy
  - Classification of bones, their blood supply and ossification
  - Classification of Joints Nerve Supply and Blood supply
  - Types and Nerve supply of Muscles
  - Definition of Neuron and Peripheral and Central nervous system
  - Surface marking of Heart, Lungs, Abdominal viscera
4. Thorax
  - Thoracic cage movements
  - Heart and its External and Internal features and Blood supply
  - Lungs, Pleura, Mediastinum (Name of contents)
5. Abdomen
  - Disposition of Abdominal and Pelvic viscera
  - Outline of Blood supply
  - Nerve supply and Lymphatic drainage and Peritoneal relation of viscera
6. Head & Neck
  - Bones, Foramina of skull
  - Names of Cranial nerves, Brief outline of 5<sup>th</sup> & 7<sup>th</sup> Cranial nerves
  - Dural venous sinuses, Blood supply and Nerve supply (brief account)
  - Nose, Pharynx and Larynx. (Blood supply and Nerve supply)

### Physiology

1. Functional organization of the human body and control of the internal environment
2. Extra cellular fluid
3. Homeostasis
4. Dehydration and Rehydration and K<sup>+</sup> Homeostasis
5. Anemia, Polycythemia
6. Resistance of body to infection-the leukocytes, tissue macrophage system and inflammation
7. Immunity and allergy
8. Hemostasis and blood coagulation
9. Cardiovascular system properties of cardiac output CCF test cardiac function & Hypertension Normal ECG Acid Base Balance urine formation
10. Respiration Spirometry Regulation Real Electrocardiogram.
11. Body fluids & kidneys; regulation of acid-base balance
12. Pulmonary blood flow
13. The nervous system and special senses
14. The gastrointestinal tract
15. Metabolism and temperature regulation
16. Endocrinology and reproduction
17. Sports Physiology
18. Ovarian and testicular function tests
19. Thyroid Parathyroid Adrenal pancreas endocrine hypothalamus

### Pathology

1. Structure and functions of normal human cell inflammatory reaction, chemical mediators primary and secondary wound healing. Factors affecting the process of healing. Healing in fractured long bone.
2. Gram + Ve organisms and lesions produced by them. Gram- Ve organisms and lesions produced by them. Mycobacterial infections, lesions and laboratory diagnosis. Viral infections like Hepatitis, AIDS, Polio, Measles etc. Fungal infections-superficial deep seated and opportunistic. Parasites of medical importance and their lab. Diagnosis such as protozoa, tape worms and round worms
3. Etiology and pathogenesis of thrombosis, complications and diagnosis thrombosis, type, mechanisms of change of various emboli, infarction and its diagnosis.
4. Nomenclature etiology of tumors, benign and malignant tumour, route of spread of malignant Tumour, effects of tumors, oncogens, Tumour suppress genes, tumour markers, and their diagnostic significance, some prototype specific Tumour.
5. Pathologic calcifications. Its types and lesions, various exogenous and endogenous pigments and lesions. Deficiency diseases and lesions.
6. Physical irritants and lesions produced by them. Ionizing Radiations and lesions produced by them. Chemical agents as a cause of tissue injury.
7. Rheumatic, ischemic and congenital Heart disease, Endocarditis. Antheroma-its etiology, lesions and complications.
8. Glomerulonephritis, pyelonephritis, stones renal tumours diabetic Nephropathy.

9. Bronchiectasis, emphysema, pneumonias, tumours, tuberculosis pneumoconiosis.
10. Oesophageal lesions, peptic ulcer, gastritis, tumours of stomach, inflammatory bowel diseases, tuberculosis of intestine, tumours of intestine.
11. Tumours of bones, inflammation of bones and joints, muscle dystrophy important skin lesions and their diagnosis, inflammations and tumours in oral cavity including teeth and jaws.
12. Tumours of C.N.S inflammations of meninges and their lab diagnosis demyelinating diseases.
13. Tumours of lymph nodes and leukemias, multiple myeloma- lesions and lab diagnosis.

### **Biochemistry**

1. Fluid & Electrolyte & Acid Base Balance in Human Body with select Clinical Scenarios.
  - Constitution of Extra & Intracellular Fluids.
  - Extracellular Fluid Compartments; Select Dehydration & Oedema Development & Management.
  - Intracellular Fluid Compartments; Select Dehydration & Oedema Development & Management.
2. Metabolic Cross Talk in Glycomics. Health & Disease Scenarios.
  - Site, Pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & Clinical Complications in Glycolysis, Hexose Shunt Pathway, Glycogenesis & Glycogenolysis, Krebs's Pathway & Glucuronic Acid Pathway.
3. Metabolic Cross Talk in Lipomics. Health & Disease Scenarios.
  - Site, pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & clinical Complications in Fatty Acid Oxidation & Biosynthesis, Ketosis, Cholesterologenesis & Lipoproteins.
4. Metabolic Cross Talk in Proteomics. Health & Disease Scenarios.
  - Site, pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & clinical Complications in Urea Cycle, Protein Biosynthesis & Select Amino acid Metabolism with Genetic Disorders.
5. The Liver & Biliary System.
  - Liver Functions & Liver Function Tests, Biliary Stasis, Cholecystitis & Pancreatitis, Jaundice.
6. Nutrition & Endocrines Modalities.
  - Basic Nutritional Principles & Calorific Requirements. Diet in health & Disease.
  - Biosynthesis, Storage, Mechanism of Release, Transport, Binding to Receptor, Mode of Activity, Biochemical Functions & Abnormalities in Vitamin A, D, K, C & B Complex.
  - Biosynthesis, Storage, Mechanism of Release, Transport, Binding to Receptor, Mode of Activity, Biochemical Functions & Abnormalities in Insulin, Glucagon, Thyroid Hormones, Para thyroid Hormones, Calcitonin, Growth Hormone, Aldosterone, Cortisol & Catecholamines.

**Course Pharmacology**

1. Basic principles: Drug receptors and pharmacodynamics, pharmacokinetics, drug biotransformation
2. Autonomic drugs
3. Cardiovascular drugs
4. Renal drugs
5. Drugs with action on smooth muscles
6. Drugs that act in the central nervous system
7. Drugs used to treat diseases of blood, inflammation and gout
8. Endocrine drugs
9. Chemotherapeutic drugs
10. Special aspects of perinatal, pediatric and geriatric pharmacology
11. Drugs used in gastrointestinal diseases
12. Therapeutic and toxic potential of over the counter drugs. Local acting Drugs.

**Module 705****5 Weeks****7.5 Credit Hours****General Pathology****Course Description and Learning Objectives:**

- Describe the responses to different types of injury at the cellular and sub-cellular level
- Enlist the differences between necrosis and apoptosis
- Describe different morphological patterns of tissue necrosis
- Describe the different types of responses of the cells to stress
- Describe the different types of exogenous and endogenous pigmentations
- Describe the sequence of vascular changes in acute inflammation (vasodilation, increased permeability) and their purpose
- Define the terms edema, transudate, and exudate
- Describe the steps involved in phagocytosis and the role of IgG and C3b as opsonins and receptors
- Compare and contrast acute vs chronic inflammation with respect to causes, nature of the inflammatory response, and tissue changes
- Describe the differences between the various cell types (i.e. labile, stable, and permanent cells) in terms of their regeneration potential. List examples of each cell type
- Distinguish between fibrinous, purulent, and serous inflammation. Define an abscess
- Describe the systemic manifestations of inflammation and their general physiology, including fever, leukocyte left shift, and acute phase reactants
- Define and understand the process of excessive growth of different types of cell
- Differentiate the non-neoplastic excessive and neoplastic growths
- Understand the differences between benign and malignant tumors
- Understand the classification of different tumors
- Understand the TNM classification of malignant tumors



- Define and describe hyperemia and congestion, edema, hemorrhage, thrombosis, infarction and embolism
- Describe shock, its different types and understand mechanisms leading to shock.
- Describe the organization of nuclear material, its replication and division
- Understand different modes of inheritance
- Describe the different types of genetic aberrations
- Understand the basis of molecular diagnosis of genetic disorders
- Define the components of the immune system
- Understand the innate and adaptive immunity, the classes of immunoglobulins
- Define humoral and cellular immunity
- Define the differences between immunity and hypersensitivity
- Describe the autoimmune diseases and their diagnosis
- Understand the immune deficiency states

### Course Contents:

1. Cellular Basis of disease (Cellular responses to stress ; Adaptations of growth and differentiation, Cell injury and cell death)
  - Hyperplasia
  - Hypertrophy
  - Atrophy
  - Metaplasia
  - Causes of Cell injury
  - Mechanisms of cell injury
  - Reversible and irreversible cell injury
  - Morphology of cell injury and necrosis
  - Apoptosis
  - Sub cellular responses to injury
  - Intracellular accumulations
  - Pathological calcification
2. Inflammation and healing
  - Acute Inflammation
  - Chemical mediators of inflammation
  - Outcomes of acute inflammation
  - Morphologic patterns of acute inflammation
  - Systemic effects of inflammation
  - Mechanisms of tissue regeneration
  - Repair by healing ,scar formation and fibrosis
3. Hemodynamic disturbances,
  - Edema
  - Hyperemia and congestion
  - Hemorrhage
  - Hemostasis and thrombosis
  - Embolism
  - Infarction
  - Shock

4. Neoplasia
  - Biology of tumor growth
  - Benign and Malignant Neoplasms
  - Molecular basis of cancer
  - Host defenses against tumors
  - Clinical features of tumors
5. Genetic Disorders
  - Mutations
  - Mendelian disorders
  - Disorders with multifactorial inheritance
  - Cytogenetic disorders
  - Single Gene disorders
  - Molecular diagnosis
  - Diagnosis of Genetic diseases
6. Diseases of immunity
  - General features of immune system
  - Cells and tissues of the immune system
  - Innate and adaptive immunity
  - Disorders of the immune system
  - Autoimmune diseases
  - Immunological deficiency syndromes

#### **Book Recommended:**

1. **Robbins Basic Pathology Updated Edition: With STUDENT CONSULT Online Access** by Vinay Kumar, Ramzi S. Cotran, and Stanley L. Robbins

#### **Module 706**

**5 Weeks**

**7.5 Credit Hours**

### **Neurophysiology of Vision & Neurophthalmology**

#### **Course Contents:**

##### **◆ Neurophysiology of Vision**

An advanced course which examines photoreceptor function, the retina, the neural processing of form and colour by the geniculo-striate system, the neural control of eye movements and accommodation by midbrain and brainstem structures, the vestibular system as it relates to vision, eye-hand co-ordination, the neural processing involved in reading

#### **Clinical Attachment**

In concerned Departments and Rooms

### **Seminars**

Will be conducted on related topics

### **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

### **Books Recommended:**

- Text Book of Visual Science and Clinical Optometry  
Edited by: Bikas Bhattacharyya

**Year 1 Semester 2**

**Class Schedule**



## Year 1 Semester 2

### Weekly Schedule

Days	8am-9am	9am-10am	10am-11am	11am-Noon	Noon-1pm	1pm-4pm
Monday					LUNCH	
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday				Self Directed Learning/ Guided Library Hours	LUNCH	

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**Total No of hours in semester** **720**

Theory Lectures hours/weeks	<input type="text" value="18"/>	18
Laboratory hours/weeks	12	12
Seminars and Assignments/weeks	06	06
Self learning hours/weeks	04	04

**Total hours/Week** **40**

Theory	70%
Practical	30%

**Module 707**

2 Weeks

3 Credit Hours

**Epidemiology of Vision Anomalies & Optical Characteristics of Eye****Course Description and Learning Objectives:**

- Student must have theoretical knowledge of distribution and frequency of visual problems. Student must be able to identify the burden of visual pathologies in his region and across the globe

- Student must understand the role of accommodation in visual system
- Students must have detail knowledge of optical characteristics of eye

**Course Contents:****a. Epidemiology of Visual Annomalies**

The distribution, determinants and frequency of vision problems. Estimates of risk factors and the development of vision problems.

**b. Accommodation and Convergence**

Mechanism of accommodation; stimulus to accommodation; time and amplitude characteristics of the response; synkinesis of accommodation and convergence; ACA ratio; the zone of clear single binocular vision

**c. Optical Characteristics of the Eye**

The refractive state of the eye and its variables; transmittance, absorption, scattering by the ocular media; pupil size, aberrations, diffraction limitations, resolution, and contrast transfer functions.

**Clinical Attachment**

In concerned Departments and Rooms

**Seminars**

Will be conducted on related topics

**Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

## **Books Recommended**

**Optometry Science, Techniques and Clinical Management**  
Mark Rosenfield, Nicola Logan, 2<sup>nd</sup> edition

## **Module 708**

**3 Weeks**

**4.5 Credit Hours**

# **Advance optometric management of ocular Pathologies**

## **Course Description and Learning Objectives:**

At the end of this module students should be able to describe the types of glaucoma, other retinal diseases understand their management and be able to select the appropriate diagnostic tests to efficiently diagnose glaucoma and other retinal pathologies whilst understanding their limitations. The level of understanding achieved by candidates should enable them to take an active part in referral refinement schemes between Optometrists and Ophthalmologists. In some instances, education beyond current optometric practice is introduced in an effort to prepare the candidates for advanced clinical challenges that this group of disorders might show.

## **Course Contents:**

### **Glaucoma**

This module covers best practice for glaucoma detection, investigation and monitoring methodologies used in Optometry and the Ophthalmology service. While discussing all the treatment options, emphasis is placed upon the advanced optometric management of this group of disorders. Differential diagnosis of optic disc cupping will also be discussed. Principles of screening for glaucoma will be covered and their significance discussed in terms of standard diagnostic techniques: perimetry, intraocular pressure measurement and optic nerve head appearance. The limitations of these techniques will be discussed in the context of new emerging technologies for the detection of glaucoma.

Areas covered will include:

- Primary glaucomas. definition, diagnosis, risk factors, IOP measurement and fluctuations, optic disc examination, other examination techniques, POAG: risk factors, mechanism, POAG suspect, evaluation of potential glaucoma, NTG,: characteristics, confirmation, differential diagnosis, PACG: definition, risk



factors, classification, manifestation, differential diagnosis, primary congenital glaucomas

- Secondary glaucomas: OAG: definition, risk factors, CAG: definition, risk factors, pigmentary glaucoma (clinical features), PEX glaucoma (clinical features), inflammatory glaucoma (clinical features), neovascular glaucoma (clinical features), post-traumatic glaucoma, lens induced glaucoma, glaucomas associated with eye surgery, glaucomas associated with drug use, secondary congenital glaucoma
- Glaucomatous versus non-glaucomatous optic disc cupping: differential diagnosis and optometric considerations
- Glaucomas, management: POAG: factors to consider, aim, when to treat, target IOP, the glaucoma suspect, targets, treatment options (medication, laser, surgery), systemic management; PACG: immediate intervention, follow-up; secondary glaucomas: management, prevention
- The principles of screening methodologies for the detection of glaucoma. How the effectiveness of diagnostic tests are evaluated in terms of sensitivity, specificity and predictive power.
- Theoretical principles of perimetry in relation to selection of the optimal testing strategy for the detection and monitoring of glaucoma.
- Statistical analysis of single and serial visual field data with respect to glaucoma diagnosis and monitoring.
- Measurement of intraocular pressure and its role in diagnosis and management of glaucoma. The assumptions and limitations of measurement techniques will be covered in conjunction with the relationship of intraocular pressure to corneal thickness.
- Anatomical features of the anterior segment will be evaluated in terms of their clinical assessment in relation to glaucoma; specifically slit lamp bio-microscopic examination and gonioscopy.
- New technologies for the detection and monitoring of glaucoma. The limitations of standard visual field assessment will be related to novel measures of the visual field using frequency doubling technology, pulsar perimetry, flicker perimetry and short-wavelength sensitive perimetry. The emergence of imaging technologies for evaluating the structure of the optic nerve head and retinal nerve fibre layer will be evaluated in terms of glaucoma diagnosis and monitoring.

## **Retinal and Macular Disorders**

The module will cover the pathophysiology, detection, assessment and management of patients with disorders of the macula and retina. Ophthalmologic treatments will be examined, as well as the role of the optometrist in the screening and management of these conditions. New technologies for detection and treatment will be described, and there will be discussion of how these technologies might fit into optometric practice. The coursework assignment will involve the student building up a series of case reports

linking theory to practice.

Areas covered will include:

- Retina and macula: structure and function
- Retinal detachment and vitreous disorders
- Retinal vessels: structure and functions
- Retinal venous and arterial disease
- Diabetic retinopathy and screening for diabetic retinopathy
- Age related macular degeneration
- Retina and macular dystrophies
- Systemic disorders and the retina
- Imaging techniques in retinal and macular disorders
- Basis of treatments for retinal disease.

### **Clinical Attachment**

In concerned Departments and Rooms

### **Seminars**

Will be conducted on related topics

### **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

### **Books Recommended**

- Text Book of Visual Science and Clinical Optometry, Edited by: Bikas Bhattacharyya
- Clinical Ophthalmology, Writer: Jaack J Kanski Sixth Edition
- Clinical Guide to Glaucoma Management  
Eve J. Higginbotham and David A. Lee

**Module 709**

**4 Weeks**

**6 Credit Hours**

## **Branches of Optometry**

### **Course Description and Learning Objectives:**

- This course is designed to have theoretical knowledge and practical experience of different specializations of Optometry
- After the completion of this course the students will acquire knowledge of the these specialties in detail

### **Course Contents:**

#### **Neuro-developmental Optometry**

Module will provide optometrists with the opportunity for education and training in the field of neurodevelopmental optometry and its application in areas such as:

- learning difficulties,
- traumatic brain injury,
- sports vision and
- binocular vision dysfunction.

#### **Geriatric Optometry**

##### **Optometric Practice for an Aging Patient Population Base**

##### **Understanding Older Patients**

- Implications of demographic trends
- Aging and the life cycle continuum
- Ageism – myths, stereotypes, and realities about older persons

##### **Meeting the Needs of Older Patients**

- Psychological and social aspects of aging
- Age-related differences in cognitive abilities
- Implications for staff role
- Implications for office design

##### **Factors that Influence the Examination and Management of the Older Patient**

- Multiple health problems
- Communication problems
- Polypharmacy – compliance issues
- Interaction of psychological, social, and physical factors
- Clinical evaluation – methods and techniques
- Interdisciplinary team care
- Institutional and home-bound patient care

### **Ocular Aging**

- Expected Age-Related Ocular Changes
- Changes in the adnexa
- Changes in extra-ocular muscles
- Media changes and effects
- Retinal aging and functional effects
- Central nervous system effects

### **Clinical Assessment and Management**

- Goals of Geriatric Patient Care: Quality of Life
- Prevention
- Maintenance
- Rehabilitation
- Enhancement
- Modification of Clinical Procedures
- Optometric and functional case history
- Assessing visual acuities
- Refracting and prescribing
- Evaluating ocular health

- Assessing visual fields
- Evaluating binocularity
- Implications for special tests
- Indications for color, contrast, and glare testing

### **Pediatric Optometry**

- Refraction of infant
- Special techniques for infant examination (OKN, Forced preferential looking, Hirshberg and Krimsky, cycloplegia)
- Prescribing for the infant, other recommendations
- Amblyopia prevention
- Contact lens fitting

### **Clinical Attachment**

- In concerned Departments and Rooms

### **Seminars**

- Will be conducted on related topics

### **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

### **Books Recommended**

**Optometry Science, Techniques and Clinical Management**  
Mark Rosenfield, Nicola Logan, 2<sup>nd</sup> edition

### **Module 710**

**4 Weeks**

**6 Credit Hours**

## **Advanced Contact Lenses**

### **Course Description and Learning Objectives:**

The module will cover the detection, assessment and management of patients requiring specialist contact lens fitting. Different approaches to management of patients will be examined, along with how they might be implemented in practice. The most common

conditions requiring advanced contact lens practice will be discussed, including methods that help to differently diagnose common and unusual problems. Advice on avoiding severe complications will be included. Students will apply these skills to patients in practice, and we will consider how to retain contact lens patients and reduce dropout rates with appropriate management.

### **Course Contents:**

- Contact lens complications and their management
- Corneal physiology in contact lens wear
- Managing dry eye in practice
- Biocompatibility in contact lens wear
- Avoiding contact lens dropouts and building your practice
- Contact lenses for the presbyopic patient
- Contact lenses for the astigmatic patient
- Contact lens use in swimming and sports
- Orthokeratology
- Fitting bespoke contact lenses

### **Clinical Attachment**

In concerned Departments and Rooms

### **Seminars**

Will be conducted on related topics

### **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

### **Books Recommended**

- Contact Lenses, Fifth Edition, Edited by: Anthony J Phillips and Lynne Speedwell Consultant Editor: Judith Morris
- Clinical Contact Lens Practice, Editors Edward S. Bennett and Barry A. Weissman

**Module 711**  
**4 Weeks**  
**6 Credit Hours**

## **Advance Low Vision Practice**

### **Course Description and Learning Objectives:**

The module will cover the detection, assessment and holistic management of patients with visual impairment. The published evidence for different approaches to low vision rehabilitation will be examined along with how they might be implemented in practice. The most common conditions causing low vision will be discussed, concentrating on how and what information should be communicated to patients and their carers. The assignment will allow candidates to apply theory to practice or to investigate the evidence basis for a chosen aspect of visual impairment.

### **Course Contents:**

- Low vision - definitions and epidemiology
- Signs, symptoms, visual effects, progression and management of the key conditions causing low vision part1
- Signs, symptoms, visual effects, progression and management of the key conditions causing low vision part2
- Visual assessment
- The patient's perspective - the psychology of visual loss
- Effective prescribing of optical and non-optical aids
- Electronic vision enhancement systems
- Assessment and management of children and people of a working age with visual impairment – including educational and working environment considerations, available resources, and charitable and government assistance
- The role of multi-disciplinary professionals in low vision - aids, lighting, eccentric viewing and mobility training
- Evaluation of outcomes and what should a comprehensive low vision service provide

### **Clinical Attachment**

In concerned Departments and Rooms

## **Seminars**

Will be conducted on related topics

## **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

## **Books Recommended**

- Low Vision Assessment  
Jane Macnaughton
- Low Vision Aid Practice  
2nd Edition  
Ajay Kumar Bhootra

## **Module 712**

**3 Weeks**

**4.5 Credit Hours**

## **Refractive Surgery**

### **Course Description and Learning Objectives:**

The module will cover the selection, assessment and management of patients choosing refractive surgery. The different approaches to management of patients will be examined along with how they might be implemented in practice. The most common refractive surgery techniques will be detailed. Different surgery for presbyopia will be included. The instrumentation that is used in the field of refractive surgery will be explained.

### **Course Contents:**

You will cover:

- Medico-legal issues and Council for Healthcare Regulatory Excellence (CHRE)
- Patient selection for refractive surgery
- Corneal topography and wavefront technology



- Patient counselling, marketing and staff training
- Instrumentation used in refractive surgery assessment
- History of refractive surgery techniques
- Laser refractive surgery
- Intraocular lenses
- Surgery for presbyopia
- Common complications and their management

### **Clinical Attachment**

In concerned Departments and Rooms

### **Seminars**

Will be conducted on related topics

### **Self Learning**

- Review of literature
- Group discussion
- Computer review

Students will consult the relevant sections of the following books

### **Books Recommended**

Mastering the Techniques of Lasik, Epilasik & Lasek (Technique & Technology)