
**CURRICULUM / STATUTES & REGULATIONS
FOR
4 YEARS DEGREE PROGRAMME
IN
OPHTHALMOLOGY
(MS Ophthalmology)**



UNIVERSITY OF HEALTH SCIENCES, LAHORE

STATUTES

Nomenclature of the Proposed Course

The name of degree programme shall be MS Ophthalmology. This name is well recognized and established for the last many decades worldwide.

Course Title:

MS Ophthalmology

Training Centers

Departments of Ophthalmology (accredited by UHS) in affiliated institutes of University of Health Sciences Lahore.

Duration of Course

The duration of MS Ophthalmology course shall be four (4) years with structured training in a recognized department under the guidance of an approved supervisor.

After admission in MS Ophthalmology Programme the resident will spend first 6 Months in the relevant Department of Ophthalmology as **Induction period** during which resident will get orientation about the chosen discipline and will also participate in the **mandatory workshops** (Appendix E). The research project will be designed and the **synopsis** be prepared during this period.

On completion of Induction period the resident will start formal training in the Basic Principles of General Surgery for 06 Months. At the end of one calendar year, the candidate will take up Abridged Examination.

During the end 2nd, 3rd & 4th years, of the Program, there will be two components of the Programme. The Research Synopsis must be got approved by AS&RB of the university within first 2 years of the Programme.

- 1) Clinical Training in Ophthalmology
- 2) Research and Thesis writing

The resident will undergo clinical training to achieve the educational objectives of MS Ophthalmology Programme (knowledge & Skills) alongwith 5 rotational placements during the 3rd year of the programme as follows :-

6 weeks Neurology, 6 weeks Pathology, 2 weeks Plastic Surgery, 2 weeks Radiology and 2 weeks Dermatology

The clinical training shall be competency based. There shall be generic and specialty competencies assessed by continuous Internal Assessment. (Appendix F&G).

The Research Component and thesis writing shall be completed over the four years duration of the Programme. Candidates will spend total time equivalent to one calendar year for research during the training. Research can be done as one block or in small periodic rotations as long as total research time is equivalent to one calendar year.

Admission Criteria

Applications for admission to MS Training Programs of University will be invited through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination.

Eligibility: The applicant on the last date of submission of applications for admission must possess the:

- i) Basic Medical Qualification of MBBS or equivalent medical qualification recognized by Pakistan Medical & Dental Council.
- ii) Certificate of one year's House Job experience in institutions recognized by Pakistan Medical & Dental Council Is essential at the time of interview. The applicant is required to submit Hope Certificate from the concerned Medical Superintendent that the House Job shall be completed before the Interview.
- iii) Valid certificate of permanent or provisional registration with Pakistan Medical & Dental Council.

Registration and Enrollment

- As per policy of Pakistan Medical & Dental Council the number of PG Trainees/ Students per supervisor shall be maximum 05 per annum for all PG programmes including minor programmes (if any).
- Beds to trainee ratio at the approved teaching site shall be at least 5 beds per trainee.
- The University will approve supervisors for MS courses.
- Candidates selected for the courses after their enrollment at the relevant institutions shall be registered with UHS as per prescribed Registration Regulation.

Accreditation Related Issues Of The Institution

A. Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC)

B. Adequate Space

Including class-rooms (with audiovisual aids), demonstration rooms, computer lab and clinical pathology lab etc.

C. Library

Departmental library should have latest editions of recommended books, reference books and latest journals (National and International).

- Accreditation of Ophthalmology training program can be suspended on temporary or permanent basis by the University, if the program does not comply with requirements for residents training as laid out in this curriculum.

- Program should be presented to the University along with a plan for implementation of curriculum for training of residents
- Programs should have documentation of residents training activities and evaluation on monthly basis.
- To ensure a uniform and standardized quality of training and availability of the training facilities, the University reserves the right to make surprise visits of the training program for monitoring purposes and may take appropriate action if deemed necessary.

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of four years MS programme in Ophthalmology is to train residents to acquire the competency of a specialist in the field so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

GENERAL OBJECTIVES

MS Ophthalmology training should enable a student to:

1. Access and apply relevant knowledge to clinical practice:
 - Maintain currency of knowledge
 - Apply scientific knowledge in practice
 - Appropriate to patient need and context
 - Critically evaluate new technology

2. Safely and effectively performs appropriate surgical procedures:

- Consistently demonstrate sound surgical skills
- Demonstrate procedural knowledge and technical skill at a level appropriate to the level of training
- Demonstrate manual dexterity required to carry out procedures
- Adapt their skills in the context of each patient and procedure
- Maintain and acquire new skills
- Approach and carries out procedures with due attention to safety of patient, self and others
- Critically analyze their own clinical performance for continuous improvement

3. Design and implement effective management plans:

- Recognize the clinical features, accurately diagnose and manage ophthalmic problems
- Formulate a well-reasoned provisional diagnosis and management plan based on a thorough history and examination
- Formulate a differential diagnosis based on investigative findings
- Manage patients in ways that demonstrate sensitivity to their physical, social, cultural and psychological needs
- Recognize disorders of the eye and related structures and differentiate those amenable to surgical treatment
- Effectively manage the care of patients with ophthalmological trauma including multiple system trauma
- Effectively recognize and manage complications

- Accurately identify the benefits, risks and mechanisms of action of current and evolving treatment modalities
- Indicate alternatives in the process of interpreting investigations and in decision-making
- Manage complexity and uncertainty
- Consider all issues relevant to the patient
- Identify risk
- Assess and implement a risk management plan
- Critically evaluate and integrate new technologies and techniques.

4. Organize diagnostic testing, imaging and consultation as needed:

- Select medically appropriate investigative tools and monitoring techniques in a cost-effective and useful manner
- Appraise and interpret appropriate diagnostic imaging and investigations according to patients' needs
- Critically evaluates the advantages and disadvantages of different investigative modalities

5. Communicate effectively:

- Communicate appropriate information to patients (and their family) about procedures, potentialities and risks associated with surgery in ways that encourage their participation in informed decision making
- Communicate with the patient (and their family) the treatment options including benefits and risks of each
- Communicate with and co-ordinate health management teams to achieve an optimal surgical environment
- Initiate the resolution of misunderstandings or disputes

- Modify communication to accommodate cultural and linguistic sensitivities of the patient

6. Recognize the value of knowledge and research and its application to clinical practice:

- Assume responsibility for self-directed learning
- Critically appraise new trends in Ophthalmology
- Facilitate the learning of others.

7. Appreciate ethical issues associated with Ophthalmology:

- Consistently apply ethical principles
- Identify ethical expectations that impact on medico-legal issues
- Recognize the current legal aspects of informed consent and confidentiality
- Be accountable for the management of their patients.

8. Professionalism by:

- Employing a critically reflective approach to Ophthalmology
- Adhering with current regulations concerning workplace harassment
- Regularly carrying out self and peer reviewed audit
- Acknowledging and have insight into their own limitations
- Acknowledging and learning from mistakes

9. Work in collaboration with members of an interdisciplinary team where appropriate:

- Collaborate with other professionals in the selection and use of various types of treatments assessing and weighing the indications and contraindications associated with each type

- Develop a care plan for a patient in collaboration with members of an interdisciplinary team
- Employ a consultative approach with colleagues and other professionals
- Recognize the need to refer patients to other professionals

10. Management and Leadership

- Effective use of resources to balance patient care and system resources
- Identify and differentiate between system resources and patient needs
- Prioritize needs and demands dealing with limited system resources.
- Manage and lead clinical teams
- Recognize the importance of different types of expertise which contribute to the effective functioning of clinical team.
- Maintain clinically relevant and accurate contemporaneous records

11. Health advocacy:

- Promote health maintenance of patients
- Advocate for appropriate health resource allocation
- Promote health maintenance of colleagues and self scholar and teacher

SPECIFIC LEARNING OUTCOMES

On completion of the training programme, Ophthalmology trainees pursuing an academic pathway will be expected to have demonstrated competence in all aspects of the published syllabus. The specific training component would be targeted for establishing clearly defined standards of knowledge and skills required to practice Ophthalmology at secondary and tertiary care level with proficiency in the Basic and

applied clinical sciences, intensive care, Emergency (A&E) medicine and Complementary surgical disciplines

1. Describe embryology, applied anatomy, physiology, pathology, clinical features, diagnostic procedures and the therapeutics including preventive methods, (medical/surgical) pertaining to Ophthalmology surgery
2. Develop clinical skills in the medical history taking and physical examination

Specialized training in:

Basic Sciences & Optics

- Anatomy & embryology of the eye
- Anatomy of orbit
- Anatomy of ocular adnexae
- Ocular circulation
- Ciliary epithelia & aqueous humour
- Intraocular pressure
- Visual Neuroanatomy
- Accommodation & Presbyopia
- Pupil
- Color vision
- Central visual pathways
- Binocular vision
- Physiology of vision

Optics & Refraction

- Visual Field Testing
- Physical optics
- Geometric optics & clinical refraction
- Contact lenses
- Low vision

Diseases of the Eye

- Anterior Segment Diseases.
- Infection of the ocular adnexa

- Corneal diseases
- Eye banking & keratoplasty
- Lens, cataract & its management.
- Intraocular lenses.
- Glaucoma.

Posterior Segment Diseases

- Hereditary retinal & choroidal diseases
- Acquired macular diseases
- Retinoblastoma & leukokoria
- Diabetic retinopathy
- Retinal Vascular Diseases
- Peripheral retinal neovascularization
- Vitreal diseases
- Uveitis, congenital anomalies & tumour

Diseases of the Orbit

- Orbital & adnexa tumours & treatment
- Tumours & related lesion of the eyelid & conjunctiva
- Lacrimal System Disorders

Oculoplastics

- Basic oculoplastic surgery
- Enucleation & evisceration
- Craniofacial anomalies

Ocular Anaesthesia & Surgeries

- Surface, infiltration, regional anesthesia
- Premedication, sedation for local anesthesia
- Premedication for general anesthesia
- Akinesia & intraocular tension during anesthesia
- Cardio pulmonary complication with anesthesia
- Cardiac arrest & local anaesthetic emergency
- Operative Surgeries

Ocular Diagnostic & Operative Instrument

- Radiology in ophthalmologic diagnosis
- Ultrasonography – A scan & B scan

- Fluorescein angiography.
- Pachymeter
- Autoperimeter
- Autorefractometer
- Applanation tonometry
- Indirect ophthalmoscope
- Recent trends / advances in ophthalmology

Ocular Manifestations of Systemic Diseases:

- Diabetes mellitus
- Hypertension
- Infectious diseases like: - Aids, tuberculosis, sarcoidosis, leprosy, etc.
- Haematological diseases
- Connective tissue disorders
- Hyperlipoproteinemias, amyloidosis
- Inborn metabolic disorders & the eye.
- Genetics & eye diseases.
- Retinal vascular occlusions.

Neuro-ophthalmology

- Ophthalmic manifestation of brain tumours
- Ophthalmic manifestation of vascular diseases of brain.
- Optic nerve disease.
- Migraine

- **Ocular Therapeutics & Toxicity**
- **Ocular Emergency & Trauma**
- **Pediatric Ophthalmology**
- **Community Ophthalmology**

Surgical management of common eye disorders:

- Injuries of eye
- Foreign body in eye
- Malignancy of eye
- Diabetic and Hypertensive retinopathy
- Styel
- Chalazion

- Blepharitis
- Cellulitis
- Corneal Ulcer
- Keratomalacia
- Scleritis, and Episcleritis
- Choroiditis
- Iridocyclitis
- Cataract
- Glaucoma
- Trachoma
- Vitreous Haemorrhage
- Optic Neuritis
- Retinal Detachment
- Myopia
- Hpermetropia
- Astigmatism
- Presbyopia
- Diplopia
- Squint
- Proptosis
- Epiphora
- Dacryocystitis
- Dacryoadenitis
- Comitant Deviations
- Noncomitant Deviations
- Strabismus Surgery
- Ocular hazards in Agriculture and Industry

Recent advances in surgical management of eye disorders

- Manual small incision cataract surgery.
- Phacoemulsification
- Newer intraocular lens implant
- Recent advances in diagnostic procedures, surgical management of glaucoma
- Recent advances in lasers in ophthalmology
- Recent advances in vitreous substitutes & perfluorocarbons
- Recent advances in retinal detachment surgery
- Recent advances in ultrasonography

- Recent advances in indocyanine green angiography
- Recent advances in optical coherence tomography
- Newer antibiotics, antifungals & antivirals
- Refractive surgery
- Retinal detachment & its managements
- Vitreo-retinal surgery
- Phacomatosis
- Corneal ulcers & its management
- Allergic conjunctivitis
- Keratoplasty & eye banking
- Lasers in ophthalmology
- Congenital cataract & its management
- Proptosis & its management
- Radiology in ophthalmology diagnosis
- Fluorescein angiography
- Use of various dyes in ophthalmology.

Research Experience:

All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist of original bench top laboratory research, clinical research or a combination of both. The research work shall be compiled in the form of a thesis which is to be submitted for evaluation by each resident before end of the training. The designated Faculty will organize and mentor the residents through the process, as well as journal clubs to teach critical appraisal of the literature.

REGULATIONS

Scheme of the Course

A summary of four years course in MS Ophthalmology is presented as under:

Course Structure	Components	Examination
<p>At the End of 1st year of Programme</p>	<ul style="list-style-type: none"> • Basic Principles of General Surgery • Basic Sciences (Anatomy, Physiology, Pharmacology, Pathology) 	<p><u>Abridged Examination</u> at the end of 1st Year of M.S. Ophthalmology Programme</p> <p>Written</p> <p>Paper MCQs Video Projected Clinical Examination</p>
<p>At the end of Final year of the Programme</p>	<p style="text-align: center;"><u>Clinical component</u></p> <ul style="list-style-type: none"> • Professional Education in Ophthalmology : Training in Ophthalmology during 2nd, 3rd & 4th years of M.S. Programme Rotation in related fields <p><u>Research component of Final Examination</u></p> <p>Research work / Thesis writing must be completed and thesis be submitted before the end of final year of the programme.</p>	<p><u>Final Examination</u> at the end of (4th) year of Ophthalmology Programme.</p> <p>Written:</p> <p>Paper I & II Problem based MCQs and SEQs in the subject, Clinical, TOACS/OSCE & ORAL.</p> <p>Continuous Internal Assessment.</p> <p>Thesis Evaluation & Defence at this End of 4th year M.S. Ophthalmology.</p>

Examinations

All candidates admitted in M.S. Ophthalmology course shall appear in Abridged Examination at the end of 1st calendar.

Eligibility Criteria:

The candidates appearing in Abridged Examination are required

- a) To have submitted certificate of completion of mandatory workshops.
- b) To have submitted certificate / certificates of completion of first year of training from the supervisor / supervisors of rotations.
- c) To have submitted CIS assessment proforma from his/her own supervisor on 03 monthly basis and also from his/her supervisors during rotation, achieving a cumulative score of 75%.
- d) To have submitted certificate of submission of synopsis.
- e) To have submitted evidence of payment of examination fee.

Abridged Examination Schedule and Fee

- a) Abridged Examination at completion of one year training, will be held twice a year.
- b) There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination.
- c) Examination fee will be determined periodically by the University.
- d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- e) The Controller of Examinations will issue Roll Number Slips on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

Abridged Examination

Abridged Examination at the end of 1st calendar

Written Examination = 300 Marks

Video projected clinical Examination = 50 Marks

Total = 350 marks

There shall be 150 MCQs with single best type of answer

Basic Principles of General surgery = 100 MCQs
Basic Sciences = 50 MCQs

Each MCQ will carry 2 marks and each incorrect response will result in deductions of 0.5 duration of this exam will be 150 minutes. The candidate securing 50% marks will pass the written examination and will be eligible to appear in the video projected clinical exam.

Video Projected Clinical Part of Abridged Exam (VPCE)

The VPCE will consist of 25 videos/ Slides of clinical material and scenarios from Ophthalmology, General Surgery. Each Video/ slide will have one question and carry 2 marks. Incorrect response will result in deduction of 0.5 marks. The Candidate securing 50% marks in VPCE will pass this part of exam

Declaration of Result

The Candidate will have to score 50% marks in written and video-projected clinical components and a cumulative score of 60% to be declared successful in the Abridged Examination.

A maximum total of four consecutive attempts (availed or unavailed) will be allowed in the Abridged Examination during which the candidate will be allowed to continue his training program. If the candidate fails to pass his Abridged Examination within the above mentioned limit of four attempts, the candidate shall be removed from the training program, and the seat would fall vacant, stipend/ scholarship if any would be stopped.

Final Examination

All candidates admitted in MS Ophthalmology course shall appear in Final (clinical) examination at the end of structured training programme (end of 4th calendar year), and having passed the Abridged examination.

Eligibility Criteria:

To appear in the Final Examination the candidate shall be required:

- i) To have submitted the result of passing Abridged Examination.
- ii) To have submitted the certificate of completion of training, issued by the Supervisor will be mandatory.
- iii) To have achieved a cumulative score of 75% in Continuous Internal assessments of all training years.
- iv) To have got the thesis submitted and will then be eligible to appear in Final Examination.
- v) To have submitted no dues certificate from all relevant departments including library, hostel, cashier etc.
- vi) To have submitted evidence of submission of examination fee.

Final Examination Schedule and Fee

- a) Final examination will be held twice a year.
- b) The candidates shall have to satisfy eligibility criteria before permission is granted to take the examination.

- c) Examination fee will be determined and varied at periodic intervals by the University.
- d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- e) The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

Components of Final Examination

Written Part of Final Examination	Total marks 500
Clinical, TOACS/OSCE & ORAL	Total marks 500
Contribution of CIS to the Final Examination	Total marks 100
Thesis Evaluation	Total marks 400
	Total marks 1500

Written Part of Final Examination

- a) There will be two written papers which will cover the whole syllabus of the specialty of training with total marks of 500.
- b) The written examination will consist of 200 single best answer type Multiple Choice Questions (MCQs) and 10 Short Essay Questions (SEQs). Each correct answer in the Multiple Choice Question paper will carry 02 marks, but an incorrect response will result in deduction of 0.5 mark. Each Short Essay Question will carry 10 marks.

c) The Total Marks of the Written Examination will be 500 and to be divided as follows:

- Multiple Choice Question paper Total Marks = 400
- Short Essay Question paper Total Marks = 100

d) The candidates scoring a score of 50% marks in multiple choice question paper and short essay question paper will pass the written part of the final examination and will become eligible to appear in the clinical and oral examination.

e) The written part result will be valid for three consecutive attempts for appearing in the Clinical and Oral Part of the Final Examination. After that the candidate shall have to re-sit the written part of the Final Examination.

Clinical and Toacs/OSCE & Oral:

a) The Clinical and Oral Examination will consist of 04 short cases, 01 long case and Oral Examination with 01 station for a pair of Internal and External Examiner Each short case will be of 07 minutes duration, 05 minutes will be for examining the patient and 02 minutes for discussion. The Oral Examination will consist of laboratory data assessment, interpretation of Radiology images, ECG and others.

b) The Total Marks of Clinical & Oral Examination will be 500 and to be divided as follows:

Short Cases	Total Marks = 200
Long Case	Total Marks = 100
TOACS/OSCE & ORAL	Total Marks = 200
	Total Marks = 500

c) A panel of four examiners will be appointed by the Vice Chancellor and of these two will be from the university whilst the other two will be the external examiners. Internal examiner will act as a coordinator. In case of difficulty

in finding an Internal examiner in a given subject, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person with appropriate qualification and experience, outside the University as an examiner.

- d) The internal examiners will not examine the candidates for whom they have acted as Supervisor and will be substituted by other internal examiner.
- e) The candidates scoring 50% marks in each component of the Clinical & Oral Examination will pass this part of the Final Examination.
- f) The candidates will have two attempts to pass the final examination with normal fee. A special administration fee of Rs.10,000 in addition to normal fee or the amount determined by the University from time to time shall be charged for further attempts.

Declaration of Result

For the declaration of result

- I. The candidate must get his/her Thesis accepted.
- II. The candidate must have passed the final written examination with 50% marks and the clinical & oral examination securing 50% marks. The cumulative passing score from the written and clinical/ oral examination shall be 60%. Cumulative score of 60% marks to be calculated by adding up secured marks of each component of the examination i.e written and clinical/ oral and then calculating its percentage.
- III. The MS degree shall be awarded after acceptance of thesis and success in the final examination.
- IV. On completion of stipulated training period, irrespective of the result (pass or fail) the training slot of the candidate shall be declared vacant.

Submission / Evaluation of Synopsis

1. The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on university website.
2. The research topic in clinical subject should have 30% component related to basic sciences and 70% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.
3. Synopsis of research project shall be submitted by the end of the 2nd year of MS program. The synopsis after review by an Institutional Review Committee shall be submitted to the University for consideration by the Advanced Studies & Research Board, through the Principal / Dean /Head of the institution.

Submission of Thesis

1. Thesis shall be submitted by the candidate duly recommended by the Supervisor.
2. The minimum duration between approval of synopsis and submission of thesis shall be one year, but the thesis can not be submitted later than 8 years of enrolment.
3. The research thesis must be compiled and bound in accordance with the Thesis Format Guidelines approved by the University and available on website.
4. The research thesis will be submitted along with the fee prescribed by the University.

Thesis Examination

- a) The candidate will submit his/her thesis at least 06 months prior to completion of training.
- b) The Thesis along with a certificate of approval from the supervisory will be submitted to the Registrar's office, who would record the date / time etc. and get received from the Controller of Examinations within 05 working days of receiving.
- c) The Controller of Examinations will submit a panel of eight examiners within 07 days for selection of four examiners by the Vice Chancellor. The Vice Chancellor shall return the final panel within 05 working days to the Controller of Examinations for processing and assessment. In case of any delay the Controller of Examinations would bring the case personally to the Vice Chancellor.
- d) The Supervisor shall not act as an examiner of the candidate and will not take part in evaluation of thesis.
- e) The Controller of Examinations will make sure that the Thesis is submitted to examiners in appropriate fashion and a reminder is sent after every ten days.
- f) The thesis will be evaluated by the examiners within a period of 06 weeks.
- g) In case the examiners fail to complete the task within 06 weeks with 02 fortnightly reminders by the Controller of Examinations, the Controller of Examinations will bring it to the notice of Vice Chancellor in person.
- h) In case of difficulty in find an internal examiner for thesis evaluation, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person as examiner in supersession of the relevant Clause of the University Regulations.

- i) There will be two internal and two external examiners. In case of difficulty in finding examiners, the Vice Chancellor would, in consultation with the concerned Deans, appoint minimum of three, one internal and two external examiners.
- j) The total marks of thesis evaluation will be 400 and 60% marks will be required to pass the evaluation.
- k) The thesis will be considered / accepted, if the cumulative score of all the examiners is 60%.
- l) The clinical training will end at completion of stipulated training period but the candidate will become eligible to appear in the Final

Examination at completion of clinical training and after acceptance of thesis. In case clinical training ends earlier, the slot will fall vacant after stipulated training period.

Award of MS Ophthalmology Degree

After successful completion of the structured course of MS Ophthalmology and qualifying Abridged and Final examinations (Written, Clinical, TOACS/OSCE & ORAL and Thesis) the degree with title MS Ophthalmology shall be awarded.

CONTENT OUTLINE

MS Ophthalmology

Basic Sciences:

Student is expected to acquire comprehensive knowledge of Anatomy, Physiology, Pathology, and Pharmacology relevant to surgical practice appropriate for Ophthalmology.

1. Anatomy

- *Clinical and functional anatomy with pathological and operative relevance*
- *Surgical approaches to the orbital cavity and related cranial structures*
- *Histology and embryology of eye, orbit and other related structures*
- Cell Biology: Cytoplasm – Cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
- Nucleus – nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
- Cell cycle, mitosis, meiosis, cell renewal.
- Cellular differentiation and proliferation.
- Tissues of Body: Light and electron microscopic details and structural basis of function, regeneration and degeneration. Confocal microscopy.

Embryology

General Features of Human Development

- Features of mitotic and meiotic modes of cell division. Genetic consequences of meiotic division.
- Abnormal mitotic and meiotic divisions of clinical importance.
- Gametogenesis: origin of germ cells.
- Oogenesis: prenatal and postnatal development of ova.
- Spermatogenesis: proliferation and maturation of male germ cells. Abnormal gametes, their clinical significance.
- Ovulation, fertilization and the consequences of fertilization.

Early Embryonic Development:

- Cleavage, morula and blastocyst formation and implantation. Formation of the three primary germ layers.
- List of the derivatives of the respective germ layers.

Period of the Growing Fetus:

Various stages and salient features of the fetus development

Extraembryonic Membranes:

- Development, functions and anomalies of yolk sac, amnion, chorion, allantois, umbilical cord and placenta.

Development of the External Body Form:

- Shaping of the head, neck, trunk and limbs. Common developmental anomalies associated with this.

The Branchial Apparatus:

- Development and fate of the bronchial grooves, arches and pouches. Their derivatives and anomalies.

Teratogenesis:

- Factors known to be involved in the development of congenital anomalies.
Concept of critical periods

Organs of Special Senses

- Development of special sense organs and common developmental anomalies of the eye
- Basic mechanisms of vision

The Eye / Orbit

- Walls, bony constituents and salient morphological features.
- Disposition of the contents of the orbit including muscles, nerves and vessels.
Structure and function of eyelids.
- Conjunctival sac, lacrimal gland and lacrimal apparatus, structure and functions
- Orbicularis oculi muscle, attachments, nerve supply and functions.

Eyeball

- Tunics of the eyeball and their anatomical constituents.
- Microscopic anatomy of cornea and lens, layers of retina.
- Chambers of the eye, boundaries and contents.
- Formation, circulation and functions of aqueous humour, sinus venous sclerae (canal of Schlemm), filtration angle.
- General morphological and structural features of refracting media.
- Blood supply of retina.
- The visual pathway and effect of lesions at different levels.
- Pupillary light reflex and its pathway.
- Accommodation, its mechanism and pathway.
- Colour vision and colour blindness.
- Photopic, scotopic and binocular vision.
- Field of vision and stereoscopic vision.

Histology:

Structural and Functional Organization of the Tissues of Body

- Classification of tissues and identification of various tissues particularly those related to the musculoskeletal system, in routine histological preparations under the light microscope.

The Epithelial Tissue

- General structure, functions and classification of epithelia
- Their location in the body
- General characters of serous and mucous membranes
- General structural features of exocrine and endocrine glands
- Histological picture of
 - Conjunctiva
 - Cornea
 - Sclera
 - Limbus and aqueous outflow pathways
 - Iris and pupil
 - Lens and zonular apparatus
 - Ciliary body
 - Choroid
 - Retina and retinal pigment epithelium and associated structures
 - Vitreous
 - Optic nerve

Surface and Imaging Anatomy

- Embryology of the eye
- Anatomy of the skull
- The orbital cavity
- The nasal sinus and its relation with the orbit and eye ball
- The eye ball
- Internal structure of the eye ball
- Movements of eye ball and extra ocular muscles
- The blood supply of the orbit
- The blood supply of the eye ball
- The optic nerve and its connection with the brain
- The motor and sensory nerves of the orbit and eye ball
- The Autonomic nervous system
- The visual pathways
- The association areas of the brain
- Cranial nerves
- Pituitary gland and sella turcica

- Cavernous sinus
- Carotid vessel and circle of Willis
- Higher centers

2. Physiology

- Physiology of eyelids
- Lacrimal apparatus
- Cornea
- Somatosensory features of the eye
- Extra ocular muscles
- Ocular circulation
- The ciliary epithelia and aqueous humour
- Intra ocular pressure
- Visual acuity
- Accommodation
- Pupillary reflexes
- Light detection and dark adaptation
- Colour vision
- Visual fields and visual pathways (including retinotopic organization)
- Processing of light stimuli
- Contrast sensitivity
- Eye movements
- Stereopsis
- Motion detection
- Visual perception
- Electrophysiology of the visual system
- The physiology of vitreous
- The physiology of lens
- The papillary reaction
- The physiology of vision
- Visual acuity
- Colour vision
- Retinal physiology
- Optic nerve
- The visual pathways
- The binocular vision
- Higher visual functions

- Visual cortex
- Ocular movements controls in the brain

3. Pharmacology

- The Evolution of Medical Drugs
- British Pharmacopia
- Receptors
- Mechanisms of Drug Action
- Pharmacokinetic Process
 - Absorption
 - Distribution
 - Metabolism
 - Desired Plasma Concentration
 - Volume of Distribution
 - Elimination
 - Elimination rate constant and half life
 - Creatinine Clearance
- Drug Effect
 - Beneficial Responses
 - Harmful Responses
 - Allergic Responses
- Drug Dependence, Addiction, Abuse and Tolerance
- Drug Interactions
- Pharmacology of common ophthalmological drugs
 - Cholinergic and adrenergic systems
 - Drug control of intraocular pressure
 - Serotonin
 - Histamine
 - Anti-inflammatory agents
 - Anti-infective agents
 - Immunosuppressants
 - Local anaesthetics
 - Analgesics
 - Mechanisms of drug toxicity and drugs which specifically cause ocular toxicity

4. Pathology

Pathological alterations at cellular and structural level in infection, inflammation, ischaemia, neoplasia and trauma affecting the organ systems related to the practice of ophthalmology

Cell Injury and adaptation

- Reversible and Irreversible Injury
- Fatty change, Pathologic calcification
- Necrosis and Gangrene
- Cellular adaptation
- Atrophy, Hypertrophy,
- Hyperplasia, Metaplasia, Aplasia

Inflammation

- Acute inflammation
- Cellular components and chemical mediators of acute inflammation
- Exudates and transudate
- Sequelae of acute inflammation
- Chronic inflammation
- Etiological factors and pathogenesis
- Distinction between acute and chronic (duration) inflammation
- Histologic hallmarks
- Types and causes of chronic inflammation, non-granulomatous & granulomatous,

Haemodynamic disorders

- Etiology, pathogenesis, classification and morphological and clinical manifestations of Edema, Haemorrhage, Thrombosis, Embolism, Infarction & Hyperaemia
- Shock; classification etiology, and pathogenesis, manifestations.
- Compensatory mechanisms involved in shock
- Pathogenesis and possible consequences of thrombosis
- Difference between arterial and venous emboli

Neoplasia

- Dysplasia and Neoplasia
- Benign and malignant neoplasms
- Etiological factors for neoplasia
- Different modes of metastasis
- Tumor staging system and tumor grade

Genetics

- Oncogenes, and genetics of malignancy (including retinoblastoma)
- Inherited ocular disease : including for example retinitis pigmentosa, aniridia, choroidaemia, stationary night blindness, Norrie's disease
- Genetics of ocular disorders and of general conditions which contain an ocular component
- Principles of gene therapy

Immunity and Hypersensitivity

- Immunity
- Immune response
- Diagnostic procedures in a clinical Immunology laboratory
- Protective immunity to microbial diseases
- Tumour immunology
- Immunological tolerance, autoimmunity and autoimmune diseases.
- Transplantation immunology
- Hypersensitivity
- Immunodeficiency disorders
- Immunoprophylaxis & Immunotherapy

Related Microbiology

- Role of microbes in various
- Normal and abnormal microbiology of bacterial, viral & parasitical infections
- Infection source
- Nosocomial infections
- Bacterial growth and death
- Pathogenic bacteria
- Vegetative organisms
- Spores
- Important viruses
- Important parasites
- Surgically important microorganisms
- Sources of infection

- Asepsis and antisepsis
- Sterilization and disinfection
- Infection prevention
- Immunization
- Personnel protection from communicable diseases
- Use of investigation and procedures in laboratory and interpret the results
- Swab collection/transfer and inoculation
- Gram staining
- Biopsy-collection and transfer
- Basics in allergy and immunology

Special Pathology

- Infections of the ocular tissues
 - Bacterial
 - Viral
 - Fungal infection of
 - Conjunctiva
 - Corneal
 - Eye coats
 - Orbit
 - Cavernous sinus
 - Meninges
 - Metastatic infections
 - Para nasal sinus infection
- Sympathetic ophthalmitis
- Conjunctival/corneal and scleral pathology
- Lid pathology
- Pathology of the lens
- Pathology of Glaucoma
- Retinal pathologies and Retinopathies
- Pathology of the optic nerve
- Congenital anomalies and abnormalities
- AIDs
- Specific viral pathologies
- Tumours of the lids and adnexa
 - Ocular tumours
 - Orbital tumours
 - Metastatic tumours of the eye and orbits

- Tumours directly invading orbits
- Drug reactions and eye
- Ocular involvement in systemic diseases
 - Diabetes Mellitus
 - Hypertension
 - Leukemias
 - Anaemia
 - Connective tissue disorders
 - Endocrine disorders
 - Ocular involvement in CNS disease process
 - Brain and pituitary tumours, Rathke's pouch
 - Demyelinating disease
 - Aneurysm
 - Raised intra cranial pressure
 - Ordering relevant investigation

Immunology

- Eye transplantation and pathophysiology of allograft rejection

MS Ophthalmology

Fundamental Principles of Surgery

- History of surgery
- Preparing a patient for surgery
- Principles of operative surgery: asepsis, sterilization and antiseptics
- Surgical infections and antibiotics
- Basic principles of anaesthesia and pain management
- Acute life support and critical care:
 - Pathophysiology and management of shock
 - Fluids and electrolyte balance/ acid base metabolism
 - Haemostasis, blood transfusion
- Trauma: assessment of polytrauma, triage, basic and advanced trauma
- Accident and emergency surgery
- Wound healing and wound management
- Management of Head Trauma and injury
- Coma and Glasgow coma scale
- Nutrition and metabolism
- Principles of burn management
- Principles of surgical oncology
- Organ transplantation
- Informed consent and medicolegal issues
- Molecular biology and genetics
- Operative procedures for common surgical manifestations e.g cysts, sinuses, fistula, abscess, nodules, basic plastic and reconstructive surgery

Common Surgical Skills

Incision of skin and subcutaneous tissue:

- Langer's lines
- Healing mechanism
- Choice of instrument
- Safe practice

Closure of skin and subcutaneous tissue:

- Options for closure
- Suture and needle choice
- Safe practice

Knot tying:

- Choice of material
- Single handed
- Double handed
- Superficial
- Deep

Tissue retraction:

- Choice of instruments
- Placement of wound retractors
- Tissue forceps

Use of drains:

- Indications
- Types
- Insertion
- Fixation
- Management/removal

Incision of skin and subcutaneous tissue:

- Ability to use scalpel, diathermy and scissors

Closure of skin and subcutaneous tissue:

- Accurate and tension free apposition of wound edges

Haemostasis:

- Control of bleeding vessel (superficial)
- Diathermy
- Suture ligation
- Tie ligation
- Clip application
- Plan investigations
- Clinical decision making
- Case work up and evaluation; risk management

Pre-operative assessment and management:

- Cardiorespiratory physiology
- Diabetes mellitus
- Renal failure
- Pathophysiology of blood loss

- Pathophysiology of sepsis
- Risk factors for surgery
- Principles of day surgery
- Management of comorbidity

Intraoperative care:

- Safety in theatre
- Sharps safety
- Diathermy, laser use
- Infection risks
- Radiation use and risks
- Tourniquets
- Principles of local, regional and general anaesthesia

Post-operative care:

- Monitoring of postoperative patient
- Postoperative analgesia
- Fluid and electrolyte management
- Detection of impending organ failure
- Initial management of organ failure
- Complications specific to particular operation
- Critical care

Blood products:

- Components of blood
- Alternatives to use of blood products
- Management of the complications of blood product transfusion including children

Antibiotics:

- Common pathogens in surgical patients
- Antibiotic sensitivities
- Antibiotic side-effects
- Principles of prophylaxis and treatment

Safely assess the multiply injured patient:

- History and examination
- Investigation
- Resuscitation and early management
- Referral to appropriate surgical subspecialties

Technical Skills

- Central venous line insertion
- Chest drain insertion
- Bleeding diathesis & corrective measures, e.g. warming, packing
- Clotting mechanism; Effect of surgery and trauma on coagulation
- Tests for thrombophilia and other disorders of coagulation
- Methods of investigation for suspected thromboembolic disease
- Anticoagulation, heparin and warfarin
- Role of V/Q scanning, CT angiography and thrombolysis
- Awareness of symptoms and signs associated with pulmonary embolism and DVT
- Role of duplex scanning, venography and d-dimer measurement
- Initiate and monitor treatment

Diagnosis and Management of Common Surgical Conditions:

- Child with head or eye related pain
- Vomiting child
- Trauma
- Head / neck swellings
- Abscess

In terms of general experience it is expected that trainees would have gained exposure to the following procedures and to be able to perform those marked (*) under direct supervision.

- Elective Procedures
 - Lymph node biopsy*
 - Insertion of CV lines
 - Excision of skin lesions*
- Emergency Procedures
 - Incision and drainage of abscess*

MS Ophthalmology **Clinical Component**

Students should be familiar with typical clinical presentation, key physical findings, radiological findings and differential diagnosis, initial treatment, and referral indications in ophthalmology.

Optics and Refraction

- Physical optics
- Geometric optics
- Clinical optics
- Properties of Light and its application to human eye
- Prisms
- Spherical and astigmatic eye
- Aberration of the optical system
- Accommodation and its disorders
- Aphakia and Pseudophakia
- Presbyopia
- Reduced eye
- Instruments
- Autorefractometer
- Retinoscope
- Ophthalmoscope
- Microscopes
- Lasers
- Keratorefractive surgery principle
- Contact Lenses

Trauma and Emergency Ophthalmology

- Superficial ocular trauma: including assessment and treatment of foreign bodies, abrasions and minor lid lacerations
- Severe blunt ocular injury: management of hyphaema - recognition and initial management of more severe injury.

- Severe orbital injury: recognition and initial care of corneal and scleral wounds; recognition of aqueous leakage and tissue prolapse.
- Retained intraocular foreign body; anticipation from history, confirmation of X-ray and CT scan.
- Sudden painless loss of vision; recognition of retinal arterial occlusion, central retinal vein occlusion, acute ischaemic optic neuropathy, optic neuritis, urgency of treatment.
- Severe intraocular infection; recognition and initial investigation and management of hypopyon.
- Acute angle closure glaucoma; recognition and acute reduction of intraocular pressure.
- Liaisons with Radiological department, Microbiologist, ENT and Faciomaxillary surgeons.

Disorders of the lids, lacrimal drainage apparatus, orbit and oculoplasty

- Abnormal lid position; including assessment of ectropion, entropion, ptosis, trichiasis, lagophthalmos and exposure.
- Abnormal lid swelling, including chalazion, stye, retention cysts, papilloma and basal cell carcinoma.
- The watering eye, including the distinction between excessive lacrimation and epiphora, blepharitis, recognition and investigation of nasolacrimal obstruction.
- Orbital swelling, including dysthyroid eye disease, distinguishing intraconal from extraconal space occupying lesions, orbital cellulitis, recognition of compressive optic neuropathy.
- Sebaceous carcinoma of lid and squamous cell carcinoma
- Cicatricial malposition of the lids
- Management of ptosis and blepharospasm
- Canaliculus repair
- Dacryocystorhinostomy
- Orbital and lacrimal tumours and their treatment
- Inflammatory orbital and lacrimal diseases and their treatment
- Paranasal sinus disease
- Use of radiographs, MRI, CT scan
- Enucleation, evisceration and fitting of prosthesis
- Exenteration

- Liaison with Neurosurgeons, ENT, Endocrinologists and orbit reconstruction Services.

External eye disease, sclera, cornea and anterior segment

- External disease, including viral, bacterial and chlamydial conjunctivitis.
 - The dry eye, including symptoms, assessment of reduced tear production and tear film stability and treatment.
 - Allergic and atopic eye disease recognition and management.
 - Corneal ulceration from viral and bacterial disease, marginal keratitis.
 - Complications of contact lens wear.
 - Corneal oedema, opacity and ectasia, indications for corneal transplantation, standards of care in donor eye procurement, signs of corneal graft rejection and other complications.
 - Episcleritis, recognition and management.
 - Anterior uveitis, including classification, differential diagnosis, systemic associations, investigations and treatment.
 - Liaison with microbiology, immunology
 - Acanthamoeba keratitis and fungal keratitis
 - Cicatricial conjunctival disease.
 - Punctal occlusion
 - Corneal topography and specular microscopy
 - Corneal stromal dystrophies, interstitial keratitis.
 - Corneal biopsy, indications.
 - Chemical injury of the cornea and conjunctiva.
 - Therapeutic contact lenses and their complications.
 - Corneal transplantation, immunology of rejection.
 - Limbal stem cell transplantation.
-
- Autoimmune corneal and scleral disease including peripheral ulcerative keratitis.
 - Use of immunosuppressive therapies.
 - Management of pterygium.
 - Conjunctival and uveal tumours.
 - Aniridia and other dysgenesis.
 - Fuch's heterochromic cyclitis.

Optics and refraction, contact lens and low vision aids

- Ametropia, including hypermetropia, myopia, astigmatism and their complications.

- Accommodation problems, including spasm and presbyopia.
- Knowledge of contact lens fitting, indications, management and complications.
- Low vision aids services and rehabilitation of a low vision patient.
- Basis of spectacle intolerance from poor dispensing or defective prescription.
- Use of log MAR charts in assessment of acuity.
- Alternatives to capsular IOL fixation.
- Combined cataract and glaucoma/corneal transplantation surgery.
- Ectopia lentis and Marfan's syndrome.
- Contact lenses and refractive surgery.
- Therapeutic contact lenses.
- Fluidics and ultrasonics.
- Intraocular lens design and biomaterials.

Disorders of lens and glaucoma

- Lens opacifications, including types of cataract, relationship of opacity to symptoms, contribution to visual loss in co-morbidities, systemic associations, cataract surgery and its complications.
- Pseudoexfoliation of the lens capsule, including its recognition and significance.
- Calculation of intraocular lens power, according to the patient's needs.
- Glaucomatous optic neuropathy, recognition and investigation.
- Glaucoma suspects, including ocular hypertension.
- Rubeotic glaucoma recognition, differential diagnosis and management.
- Hypotensive agents, topical and systemic drugs affecting intraocular pressure and their complications.
- Glaucoma drainage surgery, indications, complications and their treatment.
- Hypotony, including its causes and consequences.
- Risk factors for primary open-angle and normal-tension glaucoma
- Other secondary glaucomas, including phacolytic, pigmentary, erythroclastic, pseudo-exfoliative and silicone-oil glaucomas.
- Posner Schlossman syndrome.
- Chronic closed angle glaucoma.
- Malignant glaucoma
- Tonopen, Perkins and non-contact tonometry.
- Scanning laser ophthalmoscopy and nerve fibre layer analysis
- Argon laser trabeculoplasty
- Prevention of glaucoma bleb failure e.g. using anti-metabolites
- Drainage tubes and stents.

- Cycloablation.

Vitreoretinal disorders

- Diagnosis and management of anterior, intermediate and posterior uveitis
- Flashes and floaters, complications of posterior vitreous detachment and recognition of retinal tears.
- Vitreous haemorrhage, from retinal tears or neovascularization - initial management.
- Retinal detachment, classification, predisposition, recognition and urgency of treatment, recognition of proliferative vitreoretinopathy.
- Diabetic retinopathy, classification, screening strategies, management.
- Hypertensive and arteriosclerotic retinopathy, including macroaneurysms and branch retinal vein occlusion.
- Retinal vascular occlusions, recognition of ischaemic and exudative responses, rubeosis.
- Macular diseases, including recognition of age related maculopathy, subretinal neovascularization, cystoid macular oedema, macular hole, related symptomatology and urgency of treatment.
- Fluorescein angiography, indications, complications and interpretation.
- Fundus imaging including scanning laser ophthalmoscopy.
- Indocyanine green angiography.
- Electro diagnostic tests and dark adaptation.
- Genetic retinal disease, retinal dystrophies, retinoblastoma
- Differential diagnosis and treatment of malignant melanoma.
- Macular laser photocoagulation, principles and laser safety.
- Toxic maculopathy and central serous retinopathy.
- Intraocular lymphoma.
- Intermediate and posterior uveitis, toxoplasmosis, toxocara and sympathetic ophthalmia, retinal vasculitides.
- Coats' disease, other telangiectasis and the retinal phakomatoses.
- AIDS-related opportunistic infections and anti-AIDS treatment
- B-Scan ultrasound for opaque media.
- Vitreoretinal surgery, including closed intraocular microsurgery, scleral buckling and internal tamponade.
- Intraocular foreign body, complications and management.
- Other vasoproliferative vitreoretinopathies including sickle cell retinopathy, retinopathy of prematurity, Eales' disease.

- Genetic vitreoretinal disease-Stickler syndrome, X-linked retinoschisis.
- Asteroid hyalosis
- Choroido-retinal coloboma

Disorders of the optic nerve and visual pathways- Neurophthalmology

- Swollen optic disc, differential diagnosis, recognition and evaluation of papilloedema, ischaemic optic neuropathy (arteritic and non-arteritic), acute optic neuritis and congenital optic disc anomalies.
- The atrophic optic disc, recognition and differential diagnosis, clinical evaluation of optic nerve function.
- Visual pathway disorders, identification of site and nature of lesion from history, examination and investigations, transient ischaemic attacks.
- Examination of cranial nerve palsies particularly III, IV, VI, VII and V nerve
- Benign intracranial hypertension
- Compressive optic neuropathy
- Optic nerve glioma
- Chiasmal lesions
- Visual evoked responses
- Neuro-imaging including CT, MRI and carotid Doppler
- Carotid endarterectomy
- Multiple sclerosis and its ophthalmic manifestations
- Higher cortical dysfunction, including the visual agnosias.

Strabismus and paediatric Ophthalmology

- Concomitant strabismus, screening strategies, epicanthus, accommodative aspects, interpretations of orthoptic report, indications for surgery.
- Amblyopia, anisometropic, stimulus-deprivation, strabismic prevention and treatment using occlusions.
- Incomitant strabismus, cranial nerve palsies including diabetic mononeuropathies, significance of painful third nerve palsy and of pupil sparing, prediction of post operative diplopia.
- Approach to infants, children and their parents.
- Ophthalmia neonatorum, diagnosis and management.
- Congenital nasolacrimal obstruction; recognition and management
- Ametropia in children, significance and treatment
- The apparently blind infant, normal and delayed visual maturation

- Paediatric cataract surgery and paediatric glaucoma.
- Nystagmus
- Ocular motility syndromes (duane's, brown's)
- Use of botulinum toxin
- Ocular myopathies and the neuromuscular junction
- Supranuclear eye movement disorders
- Fresnel prisms
- Oblique muscle, vertical muscle and adjustable suture surgery
- Electromyography.
- Assessment of vision in children, fixation, preferential looking, single and linear optotype tests.
- Cycloplegic refraction and prescribing for children.
- Fundoscopy in children.
- Ocular albinism Congenital nystagmus
- Congenital glaucoma, diagnosis and management.
- Congenital cataract, diagnosis and management including prevention of amblyopia.
- Leucocoria, differential diagnosis including retinoblastoma.
- Retinopathy of prematurity, screening and treatment.
- Paediatric neurological diseases.
- Ophthalmic signs of child abuse
- Orbital Cellulitis presenting in children.
- Orbital tumours in children, including rhabdomyosarcoma.

Diagnostic Ophthalmology

- Ultra sound A and B scan
- Visual fields examination
 - Manual
 - Automated
- Orthoptics and use of amblyoscope
- Lees and Hess charting
- Maddox wing and rod testing
- Prisms use
- Fundus angiography
- Low vision aids and tool

Neurology

- Assessment of neurological patient for level of consciousness
- Higher cerebral function
- Cranial nerve assessment
- Posture and gait
- The Unconsciousness
- Headache and allied disorders
- Raised intra cranial pressure
- Benign intra cranial hypertension
- Transient loss of vision
- Pupillary disorders
- Facial Pain
- Head injury
- Intra cranial tumours
- Hydrocephalus
- Nystagmus
- Cerebellar disorders

Radiology

- Interpretation of a radiograph
- Radiography of Orbit
- Radiography of the skull
- Radiography of the Lacrimal passages
- Limbs and spine
- Ultra sound of the eye ball and orbits, both A and B scan
- Orbital and brain CT
- MRI
- Other imaging techniques

Common Ophthalmic Skills and Procedures

- On completion of the initial training in Part I, the trainees will be competent in all aspects of the basic, operative and non operative care of surgical patients
- During Part II training, they will understand the importance of ophthalmic care and management with particular reference to common ophthalmological presentations recognizing and preventing secondary disorders. They will be capable of resuscitating, assessing and initiating the surgical management of patients deteriorating as a result of local and systemic complications. They will

demonstrate sound judgment when seeking more senior support, prioritizing medical interventions and escalating the level of medical care.

General surgical care:

- Administration of antibiotics in the surgical patient
- Use of blood and its products
- The role/complications of diathermy
- Pain relief in surgery
- Thrombo-embolic episodes
- Prevention and management
- Wound care and nosocomial infection
- Suture techniques and materials
- Initial assessment and management

Specialized Surgical Skills

- Anesthesia and Akinesia for ophthalmic procedure
- The eyelids and reconstructive eye surgery
- Surgery of Lacrimal apparatus
- The extra ocular muscles and strabismus surgery
- Surgical procedure on conjunctiva, sclera and cornea
- Surgery of Iris, ciliary body and choroid
- Lens surgery and cataract
- Surgical management of glaucoma's
- Vitreoretinal surgery
- Management of ocular trauma and orbital surgery

Following clinical skills should be taught to the students

- Clinical approach
- Ophthalmic examination
- Ocular movements
- Pupillary reflexes
- Cover Tests
- Corneal sensations
- Regurgitation test and syringing
- Confrontation perimetry
- Digital and other methods of tonometry
- Measurement of corneal diameters
- Biometry
- Instrument for diagnosis

Should be able to use the instruments with expertise

- Slit Lamp
- Anterior segment and fundus camera
- Direct and Indirect Ophthalmoscope
- Colour vision testing equipment
- Bjerrum's screen/perimeter
- Automated field analyzer
 - A scan
 - B scan
- Gonioscope

Thesis Component (Fourth year of MS Ophthalmology Programme)

RESEARCH/ THESIS WRITING

Total of one year will be allocated for work on a research project with thesis writing. Project must be completed and thesis be submitted before the end of training. Research can be done as one block in 5th year of training or it can be stretched over five years of training in the form of regular periodic rotations during the course as long as total research time is equivalent to one calendar year.

Research Experience

The active research component program must ensure meaningful, supervised research experience with appropriate protected time for each resident while maintaining the essential clinical experience. Recent productivity by the program faculty and by the residents will be required, including publications in peer-reviewed journals. Residents must learn the design and interpretation of research studies, responsible use of informed consent, and research methodology and interpretation of data. The program must provide instruction in the critical assessment of new therapies and of the surgical literature. Residents should be advised and supervised by qualified staff members in the conduct of research.

Clinical Research

Each resident will participate in at least one clinical research study to become familiar with:

1. Research design
2. Research involving human subjects including informed consent and operations of the Institutional Review Board and ethics of human experimentation
3. Data collection and data analysis
4. Research ethics and honesty
5. Peer review process

This usually is done during the consultation and outpatient clinic rotations.

Case Studies or Literature Reviews

Each resident will write, and submit for publication in a peer-reviewed journal, a case study or literature review on a topic of his/her choice.

Laboratory Research

Bench Research

Participation in laboratory research is at the option of the resident and may be arranged through any faculty member of the Division. When appropriate, the research may be done at other institutions.

Research involving animals

Each resident participating in research involving animals is required to:

1. Become familiar with the pertinent Rules and Regulations of the University of Health Sciences Lahore i.e. those relating to "Health and Medical Surveillance Program for Laboratory Animal Care Personnel" and "Care and Use of Vertebrate Animals as Subjects in Research and Teaching"
2. Read the "Guide for the Care and Use of Laboratory Animals"
3. View the videotape of the symposium on Humane Animal Care

Research involving Radioactivity

Each resident participating in research involving radioactive materials is required to

1. Attend a Radiation Review session

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2. Work with an Authorized User and receive appropriate instruction from him/her.

METHODS OF INSTRUCTION/COURSE CONDUCTION

As a policy, active participation of students at all levels will be encouraged. Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Clinico-pathological Conferences
6. SEQ as assignments on the content areas
7. Skill teaching in ICU, Operation theatres, emergency and ward settings
8. Attend genetic clinics and rounds for at least one month.
9. Self study, assignments and use of internet
10. Bedside teaching rounds in ward
11. OPD & Follow up clinics
12. Long and short case presentations

In addition to the conventional teaching methodologies interactive strategies like conferences will also be introduced to improve both communication and clinical skills in the upcoming consultants. Conferences must be conducted regularly as scheduled and attended by all available faculty and residents. Residents must actively request autopsies and participate in formal review of gross and microscopic pathological material from patients who have been under their care. It is essential that residents participate in planning and in conducting conferences.

1. Clinical Case Conference

Each resident will be responsible for at least one clinical case conference each month. The cases discussed may be those seen on either the consultation or clinic service or during rotations in specialty areas. The resident, with the advice of the Attending Surgeon on the Consultation Service, will prepare and present the case(s) and review the relevant literature.

2. Monthly Student Meetings

Each affiliated medical college approved to conduct training for MS Ophthalmology will provide a room for student meetings/discussions such as:

- a. Journal Club Meeting
- b. Core Curriculum Meetings
- c. Skill Development

a. Journal Club Meeting

A resident will be assigned to present, in depth, a research article or topic of his/her choice of actual or potential broad interest and/or application. Two hours per month should be allocated to discussion of any current articles or topics introduced by any participant. Faculty or outside researchers will be invited to present outlines or results of current research activities. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department.

b. Core Curriculum Meetings

All the core topics of Ophthalmology should be thoroughly discussed during these sessions. The duration of each session should be at least two hours once a month. It should be chaired by the chief resident (elected by the residents of the relevant discipline). Each resident should be given an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

c. Skill Development

Two hours twice a month should be assigned for learning and practicing clinical skills.

List of skills to be learnt during these sessions is as follows:

1. Residents must develop a comprehensive understanding of the indications, contraindications, limitations, complications, techniques, and

interpretation of results of those technical procedures integral to the discipline

2. Residents must acquire knowledge of and skill in educating patients about the technique, rationale and ramifications of procedures and in obtaining procedure-specific informed consent. Faculty supervision of residents in their performance is required, and each resident's experience in such procedures must be documented by the program director.
 3. Residents must have instruction in the evaluation of medical literature, clinical epidemiology, clinical study design, relative and absolute risks of disease, medical statistics and medical decision-making.
 4. Training must include cultural, social, family, behavioral and economic issues, such as confidentiality of information, indications for life support systems, and allocation of limited resources.
 5. Residents must be taught the social and economic impact of their decisions on patients, the primary care physician and society. This can be achieved by attending the bioethics lectures
 6. Residents should have instruction and experience with patient counseling skills and community education.
 7. This training should emphasize effective communication techniques for diverse populations, as well as organizational resources useful for patient and community education.
 8. Residents should have experience in the performance of Ophthalmology related clinical laboratory and radionuclide studies and basic laboratory techniques, including quality control, quality assurance and proficiency standards
 9. Each resident will manage at least the related essential cases and observe and participate in each of the following procedures, preferably done on patients under supervision initially and then independently.
- (pg. 38)

3. Annual Grand Meeting

Once a year all residents enrolled for MS Ophthalmology should be invited to the annual meeting at UHS Lahore.

One full day will be allocated to this event. All the chief residents from affiliated institutes will present their annual reports. Issues and concerns related to their relevant courses will be discussed. Feedback should be collected and suggestions should be sought in order to involve residents in decision making.

The research work done by residents and their literary work may be displayed.

In the evening an informal gathering and dinner can be arranged. This will help in creating a sense of belonging and ownership among students and the faculty.

LOG BOOK

The residents must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book should be part of the requirement to sit for MS examination. Log book should include adequate

number of diagnostic and therapeutic procedures observed and performed, the indications for the procedure, any complications and the interpretation of the results, routine and emergency management of patients, case presentations in CPCs, journal club meetings and literature review.

Proposed Format of Log Book is as follows:

Candidate's Name: _____

Roll No. _____

The above mentioned procedures shall be entered in the log book as per format:

Procedures Performed

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure Performed	Supervisor's Signature
1					
2					
3					
4					

Emergencies Handled

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure/Management	Supervisor's Signature
1					
2					
3					
4					

Case Presented

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Case Presented	Supervisor's Signature
1				
2				
3				
4				

Seminar/Journal Club Presentation

Sr.#	Date	Topic	Supervisor's signature
1			
2			
3			
4			

Evaluation Record

(Excellent, Good, Adequate, Inadequate, Poor)

At the end of the rotation, each faculty member will provide an evaluation of the clinical performance of the fellow.

Sr.#	Date	Method of Evaluation (Oral, Practical, Theory)	Rating	Supervisor's Signature
1				
2				

3				
4				

EVALUATION & ASSESSMENT STRATEGIES

Assessment

It will consist of action and professional growth oriented ***student-centered integrated assessment*** with an additional component of ***informal internal assessment, formative assessment*** and measurement-based ***summative assessment***.

Student-Centered Integrated Assessment

It views students as decision-makers in need of information about their own performance. Integrated Assessment is meant to give students responsibility for deciding what to evaluate, as well as how to evaluate it, encourages students to **'own'** the evaluation and to use it as a basis for self-improvement. Therefore, it tends to be growth-oriented, student-controlled, collaborative, dynamic, contextualized, informal, flexible and action-oriented.

In the proposed curriculum, it will be based on:

- Self Assessment by the student
- Peer Assessment
- Informal Internal Assessment by the Faculty

Self Assessment by the Student

Each student will be provided with a pre-designed self-assessment form to evaluate his/her level of comfort and competency in dealing with different relevant clinical situations. It will be the responsibility of the student to correctly identify his/her areas of weakness and to take appropriate measures to address those weaknesses.

Peer Assessment

The students will also be expected to evaluate their peers after the monthly small group meeting. These should be followed by a constructive feedback according to the prescribed guidelines and should be non-judgmental in nature. This will enable students to become good mentors in future.

Informal Internal Assessment by the Faculty

There will be no formal allocation of marks for the component of Internal Assessment so that students are willing to confront their weaknesses rather than hiding them from their instructors.

It will include:

- a. Punctuality
- b. Ward work
- c. Monthly assessment (written tests to indicate particular areas of weaknesses)
- d. Participation in interactive sessions

Formative Assessment

Will help to improve the existing instructional methods and the curriculum in use

Feedback to the faculty by the students:

After every three months students will be providing a written feedback regarding their course components and teaching methods. This will help to identify strengths and weaknesses of the relevant course, faculty members and to ascertain areas for further improvement.

Summative Assessment

It will be carried out at the end of the programme to empirically evaluate cognitive, psychomotor and affective domains in order to award diplomas for successful completion of courses.

MS Ophthalmology Abridged Examinations

All candidates admitted in MS Ophthalmology course shall appear in Abridged examination at the end of 1st calendar year.

Abridged Examination at the end of 1st calendar

Written Examination	=300 Marks
Video projected clinical Examination	= 50 Marks
Total	= 350 marks

Written Paper

150 MCQs Single best answer with 2 marks for each MCQ

Principles of General Surgery	= 100 MCQs
Basic Sciences	= 50 MCQs
Anatomy	= 15 MCQs
Physiology & Biochemistry	= 15 MCQs
Pharmacology	= 05 MCQs
Pathology	= 15 MCQs

Video Projected Clinical Part of Abridged Exam (VPCE)

The VPCE will consist of 25 videos/ Slides of clinical material and scenarios from General Surgery and Ophthalmology. Each Video/ slide will have one question and carry 2 marks. Incorrect response will result in deduction of 0.5 marks.

The Candidate securing 50% marks in VPCE will pass this part of exam

Final MS Ophthalmology
Total Marks: 1500

All candidates admitted in MS Ophthalmology course shall appear in Final examination at the end of structured training programme (end of 4th calendar year) and after clearing abridged examinations.

There shall be two written papers of 250 marks each, Clinical, TOACS/OSCE & ORAL of 500 marks, thesis examination of 400 marks and Continuous Internal Assessment of 100 marks.

Final MS Ophthalmology
Clinical Examination
Total Marks: 1500

Topics included in paper 1

- | | |
|--|-----------|
| 1. External eye disease, sclera, cornea and anterior segment | (20 MCQs) |
| 2. Disorders of the lids, lacrimal drainage apparatus, orbit and oculoplasty | (20 MCQs) |
| 3. Trauma and emergency ophthalmology | (20 MCQs) |
| 4. Optics and refraction | (20 MCQs) |
| 5. Diagnostic ophthalmology | (20 MCQs) |

Topics included in paper 2

- | | |
|---|-----------|
| 1. Disorders of the optic nerve and visual pathways and neurophthalmology | (20 MCQs) |
| 2. Vitreoretinal disorders | (20 MCQs) |
| 3. Disorders of lens and glaucoma | (20 MCQs) |
| 4. Optics, refraction, contact lens and low vision aids | (20 MCQs) |
| 5. Strabismus and paediatric ophthalmology | (20 MCQs) |

Components of Final Clinical Examination

Theory

Paper I

5 SEQs (No Choice)
100 MCQs

250 Marks

50 Marks
200 Marks

3 Hours

Paper II

5 SEQs (No Choice)
100 MCQs

250 Marks

50 Marks
200 Marks

3 Hours

Only those candidates, who pass in theory papers, will be eligible to appear in the Clinical, TOACS/OSCE & ORAL.

Clinical, TOACS/OSCE & ORAL

Four short cases
One long case:

200 Marks
100 Marks

TOACS/OSCE & ORAL

200 Marks

Continuous Internal Assessment

100 Marks

Final MS Ophthalmology
Thesis Examination
Total Marks: 400

All candidates admitted in MS Ophthalmology course shall appear in Final thesis examination at the end of 4^h year of the MS programme and not later than 7th calendar year of enrolment. The examination shall include thesis evaluation with defense.

RECOMMENDED BOOKS

Anatomy

1. Snell R. S., Lemp M. A. ***Clinical Anatomy of Eye.***
2. ***Wolf's Anatomy of the Eye***
3. Newell F. W. ***Ophthalmology Principles and Concepts.***

Optics and Refraction

1. Elkington A. R., Frank H. J., Greaney M. J. ***Clinical Optics.***
2. Duke-Elder. ***Practice of Refraction.***

Physiology

1. Guyton. ***Textbook of Medical Physiology.***
2. Newell F. ***Ophthalmology Principles and Concepts.***
3. ***Adler's Physiology of the Eye.*** (For reference)

Pathology

1. Apple D. J., Rabb M. F. ***Ocular Pathology.***
2. Gree. ***Ocular Pathology.***
3. Kanski J. J. ***Clinical Ophthalmology.***

Ophthalmic Surgery

Newill F. W. ***Ophthalmology Principles and Concepts***

Ophthalmic Surgery

Willshaw H. ***Practical Ophthalmic Surgery.***

Bailey and Love. ***Short Practice of Surgery.***

Rana M. H., Ali S. Mustafa M. ***A Handbook of Behavioural Sciences for Medical and Dental Students.*** Lahore: University of Health Science; 2007.

Fathalla M. F. and Fathalla M. M. F. ***A Practical Guide for Health Researcher.*** Cairo: World Health Organization; 2004.

Journals

APPENDIX "E"
(See Regulation 9-iii)

MANDATORY WORKSHOPS

1. Each candidate of MD/MS/MDS program would attend the 04 mandatory workshops and any other workshop as required by the university.
2. The four mandatory workshops will include the following
 - a. Research Methodology
 - b. Research Ethics
 - c. Communication Skills
 - d. Introduction to Computer / Information Technology and Software programs
3. The workshops will be held on 03 monthly basis.
4. An appropriate fee for each workshop will be charged.
5. Each workshop will be of 02 - 05 days duration.
6. Certificates of attendance will be issued upon satisfactory completion of workshops.

APPENDIX "F"
(See Regulation 9xxiii, 13, 14 & 16)

CONTINUOUS INTERNAL ASSESSMENTS

a) Workplace Based Assessments

Workplace based assessments will consist of Generic as well as Specialty Specific Competency Assessments and Multisource Feedback Evaluation.

Generic Competency Training & Assessments

The Candidates of all MD / MS / MDS programs will be trained and assessed in the following five generic competencies.

i. Patient Care.

- a. Patient care competency will include skills of history taking, examination, diagnosis, plan of investigation, clinical judgment, plan of treatment, consent, counseling, plan of follow up, communication with patient / relatives and staff.
- b. The candidate shall learn patient care through ward teaching, departmental conferences, morbidity and mortality meetings, core curriculum lectures and training in procedures and operations.
- c. The candidate will be assessed by the supervisor during presentation of cases on clinical ward rounds, scenario based discussions on patient management, multisource feedback evaluation, Direct Observation of Procedures (DOPS) and operating room assessments.
- d. These methods of assessments will have equal weightage.

ii. Medical Knowledge and Research

- a. The candidate will learn basic factual knowledge of illnesses relevant to the specialty through lectures/discussions on topics selected from the syllabus, small group tutorials and bed side rounds.
- b. The medical knowledge/skill will be assessed by the teacher during case based discussions and presentations to the supervisor.
- c. The candidate will be trained in designing research project, data collection, data analysis and presentation of results by the supervisor.

- d. The acquisition of research skill will be assessed as per regulations governing thesis evaluation and its acceptance.

iii. **Practice and System Based Learning**

- a. This competency will be learnt from journal clubs, review of literature, policies and guidelines, audit projects, medical error investigation, root cause analysis and awareness of healthcare facilities.
- b. The assessment methods will include case studies, presentation in morbidity and mortality review meetings and presentation of audit projects if any.
- c. These methods of assessment shall have equal weight-age.

iv. **Communication Skills**

- a. These will be learnt from role models, supervisor and workshops.
- b. They will be assessed by direct observation of the candidate whilst interacting with the patients, relatives, colleagues and with multisource feedback evaluation.

v. **Professionalism as per Hippocratic Oath**

- a. This competency is learnt from supervisor acting as a role model, ethical case conferences and lectures on ethical issues such as confidentiality, informed consent, end of life decisions, conflict of interest, harassment and use of human subjects in research.
- b. The assessment of residents will be through multisource feedback evaluation according to proformas of evaluation and its' scoring method.

Specialty Specific Competencies

- i. The candidates will be trained in operative and procedural skills according to a quarterly based schedule.
- ii. The level of procedural competency will be according to a competency table to be developed by each specialty.

iii. The following key will be used for assessing operative and procedural competencies:

a. **Level 1 Observer status**

The candidate physically present and observing the supervisor and senior colleagues

b. **Level 2 Assistant status**

The candidate assisting procedures and operations

c. **Level 3 Performed under supervision**

The candidate operating or performing a procedure under direct supervision

d. **Level 4 Performed independently**

The candidate operating or performing a procedure without any supervision

iv. **Procedure Based Assessments (PBA)**

a. Procedural competency will assess the skill of consent taking, preoperative preparation and planning, intraoperative general and specific tasks and postoperative management

b. Procedure Based assessments will be carried out during teaching and training of each procedure.

c. The assessors may be supervisors, consultant colleagues and senior residents.

d. The standardized forms will be filled in by the assessor after direct observation.

e. The resident's evaluation will be graded as satisfactory, deficient requiring further training and not assessed at all.

f. Assessment report will be sub

g. A satisfactory score will be required to be eligible for taking final examination.

Multisource Feedback Evaluation

- i. The supervisor would ensure a multisource feedback to collect peer assessments in medical knowledge, clinical skills, communication skills, professionalism, integrity, and responsibility.
- ii. Satisfactory annual reports will be required to become eligible for the final examination

b) Completion Of Candidate's Training Portfolio

- i. The Candidate's Training Portfolio (CTP) will be published (or computer based portfolio downloadable) by the university.
- ii. The candidates would either purchase the CTP or download it from the KEMU web site.
- iii. The portfolio will consist of the following components
 - a) Enrollment details.
 - b) Candidate's credentials as submitted on the application for admission form.
 - c) Timeline of scheduled activities e.g dates of commencement and completion of training, submission of synopsis and thesis, assessments and examination dates etc (**Appendix H**)
 - d) Log Book of case presentations, operations and procedures recorded in an appropriate format and validated by the supervisor.
 - e) Record of participation and presentations in academic activities e.g lectures, workshops, journal clubs, clinical audit projects, morbidity & mortality review meetings, presentation in house as well as national and international meetings.
 - f) Record of Publications if any.
 - g) Record of results of assessments and examinations if any
 - h) Synopsis submission proforma and IRB proforma and AS&RB approval Letter
 - i) Copy of Synopsis as approved by AS&RB
- iv. Candidates Training Portfolio shall be assessed as per proforma given in "**Appendix-G**".

Supervisor's Annual Review Report.

This report will consist of the following components:-

- i. Verification and validation of Log Book of operations & procedures according to the expected number of operations and procedures performed (as per levels of competence) determined by relevant board of studies.
- ii. A 90 % attendance in academic activities is expected. The academic activities will include: Lectures, Workshops other than mandatory workshops, Journal Clubs, Morbidity & Mortality Review Meetings and Other presentations.
- iii. Assessment report of presentations and lectures
- iv. Compliance Report to meet timeline for completion of research project.
- v. Compliance Report on Personal Development Plan.
- vi. Multisource Feedback Report, on relationship with colleagues, patients.
- vii. Supervisor will produce an annual report based on assessments as per proforma in appendix-G and submit it to the Examination Department.
- viii. 75 % score will be required to pass the Continuous Internal Assessment on annual review.

APPENDIX " G "

(See Regulation 9ix, 9xxiii-d, 10, 11, 14 & 16)

Supervisor's Evaluation

PROFORMA FOR CONTINUOUS INTERNAL ASSESSMENTS

1. Generic Competencies			
(Please score from 1 – 100. 75% shall be the pass marks)		Component Score	Score achieved
i.	Patient Care	20	
ii.	Medical Knowledge and Research	20	
iii.	Practice and System Based Learning		
	• Journal Clubs	04	
	• Audit Projects	04	
	• Medical Error Investigation and Root Cause Analysis	04	
	• Morbidity / Mortality / Review meetings	04	
iv.	Communication Skills		
	• Informed Consent	10	
	• End of life decisions	10	
v.	Professionalism		
	• Punctuality and time keeping	04	
	• Patient doctor relationship	04	
	• Relationship with colleagues	04	
	• Awareness of ethical issues	04	
	• Honesty and integrity	04	
2. Specialty specific competencies			
Please score from 1 – 100. 75% shall be the pass marks			Score achieved
Operative Skills / Procedural Skills			
3. Multisource Feedback Evaluation (Please score from 1 – 100. 75% shall be the pass marks)			
4. Candidates Training Portfolio (Please score from 1 – 100.75% shall be the pass marks)			
(Please score from 1 – 100. 75% shall be the pass marks)		Component Score	Score achieved
i.	Log book of operations and procedures	25	
ii.	Record of participation and presentation in academic activities	25	
iii.	Record of publications	25	
iv.	Record of results of assessments and examinations	25	