Course Title (Symbol and No.): **432 OPH**

Ophthalmology

Credit Hours: **4 (1+3)**

Contact Clock Hours:
Theoretical:

Clinical

Tutorials & Practical:

Course Objectives

Course 432 is meant to introduce Medical Students to basic history taking and examination of the eye.

The common ophthalmic conditions will be taught, including the principles for management of these conditions. This material will be released to the Students through:

1. Lectures
2. Clinical Sessions
3. Clinic attendance
4. Surgical sessions attendance

At the end of the course, the Medical Student should be able to recognize common ocular pathology, manage simple cases and know when to refer more serious problems.

Course Outline

(a) Theoretical

1. Applied anatomy and physiology of the Eye
2. Lid and lacrimal system problems
3. Red Eye and Ocular emergencies
4. Strabismus and amblyopia and leukocoria
5. Eye andSystemic Diseases
6. Neuro-ophthalmology
7. Pharmacology and Toxicology
8. Visual fields

9. Errors of refraction
10. Retinal glaucoma disorders

(c) Practicals

1. Orientation, history taking and ocular examination
2. Ophthalmoscopy and tonometry

Distribution of Assessment Marks

At the end of the six weeks rotation in Ophthalmology, the Student will sit for a Continuous Assessment Examination. This will consist of forty (40) multiple choice questions (40 marks), covering clinical aspects of the subject and topics taken in lectures and tutorials.

At the end of the cycle, he or she will sit for a Final Examination consisting of forty (40) multiple choice questions (20 marks), and an oral examination (40 marks) that will concentrate on testing the students ability to recognize clinical signs and formulate a decent differential diagnosis and treatment.

Summary

1. Continuous assessment	40 MCQ's	(40 marks)
2. Final examination	40 MCQ'S	(20 marks)
3. Final Oral examination		(40 marks)
	Total	100 marks

The Book Recommended

1. Basic Ophthalmology for Medical Students and Primary Care Residents by Frank G. Berson, MD Referred references
2. General Ophthalmology by Vaugh and Asbury and Tabbara.

Course Outline

(a) Lectures

Topic (lectures)	Time allowed

1. Applied Anatomy and Physiology + Lid and Lacrimal System Problems	2 hours
2.Glaucoma Diagnosis and Management	1 hour
3. Trachoma	1 hour
4. Red Eye	2 hours
5. Diseases of Retina and Choroid	1 hour
6. Ocular Emergencies	1 hour
7. Strabismus and Amblyopia	1 hour
8. Errors of Refraction	1 hour
9. Systemic Diseases	2 hours
10. Eye Care in Children and Prevention of Blindness	1 hour
11. Disorders of the Lens	1 hour
12. Neuro-ophthalmology	1 hour

(b) Clinical Skills

1. History taking, Ocular Examination and Tonometry	3 hours
2. Ophthalmoloscopy	3 hours
3. Ancillary Services	3 hours

(c) Topic (Tutorial)

1. Leukocoria	2 hours
2. Ocular Pharmacology, Drug Toxicity	2 hours
3. Ocular Emergencies	2 hours
4. Visual Fields and Elementry Optics	2 hours
5. Proptosis	2 hours

Applied Ophthalmic Anatomy and Physiology

1. Embryonic Tissue Derivatives. (Not important; only as an entry topic)
2. Structure, Function and Pathology:

a) General topography:

- Symmetry of lids, lid crease, relation of lids to corneas, direction of lashes
- Orbital margins
- Diameters of the cornea.
- Axial length of the globe and orbit.
- Power of the eye (cornea and lens)
- Site of lacrimal gland, lacrimal sac and nasal opening of nasolacrimal duct.

- Corneal light reflection and its importance.
- Ocular movements and position of gaze and muscle responsible for each movement.

b) Simplified lid anatomy, function and possible pathology e.g. blepharitis, chalazion, ptosis, etc.

c) Conjunctiva - Bulbar, palpebral and Goblet cells and role in tear film, loss of Goblet cells.

d) Cornea - Layers, transparency. Pathology - oedema, opacity, thinning, etc.

e) Sclera - Brief anatomy, muscle attachments. Pathology - scleritis.

f) Iris/Pupil - Structure, innervation.

g) Anterior Chamber and Angle.

- Boundary of anterior chamber
- Component of angle
- Open angle and closed angle.

h) Ciliary body

- Component
- Muscle, innervation, attachment to scleral spur.
- Accommodation, attachment of zonule.
- Aqueous secretion, adrenergic receptor and carbonic anhydrase.
- Relation of vitreous base.

i) Limbus

- Junction between conjunctiva, cornea and sclera.
- Site of most intraocular surgeries.

j) Lens - Position, diameter, fine anatomy, clarity, accommodation.

k) Retina/Macula/Optic Nerve Head.

Layer, (sensory and RPE), blood supply, nutrition, photoreceptors, nerve fiber layer, visual pigment, vitamin A, role of RPE, effect of light.

- Anatomical specification of macula, arcuate nerve fiber and vessels.
- Optic nerve head (Blind spot), papillomacular bundle.
- Rod 120 million, cone 7 million, optic nerve fiber 1 million.
- Relation of retinal topography and VF.

- Importance of decussation at chiasma.
- No fluorescein leakage.

l) Choroid - Brief anatomy, importance.

m) Vitreous - Attachment; base, around disc, macula, blood vessel.

Pathology; Retinal tears, etc.

n) Orbit.

- Bone; ethmoiditis
- Muscle; innervation and function
- Optic nerve length
- Blood vessels
- Nerves
- Fissure

o) Lacrimal System

- Tear film, 3 layers and function
- Tear secretion
- Tear excretion, including lacrimal pump.
- Pathology; Epiphora, NLD system, KCS-Schirmer test, Lacrimal gland disorder, dacrocystitis, DCR.

Glaucomas - Diagnosis and management

1) Criteria in Common

a. Increase IOP.

b. Angle specification.

c. Optic nerve pathology.

d. VF characteristics

2) Types, Etiology, Mechanism and Management

a) Open angle glaucoma.

- Primary; Definition, mechanism, diagnosis, management

- Secondary; Inflammation, angle recession, hetrochromia, pigment dispersion, phacolytic and pseudoexfoliation.

b) Angle Closure.

- Primary; Sub acute, acute, chronic, definitions, mechanism, diagnosis, management.
- Secondary; Neovascular, phacomorphic, and tumor.

c. Congenital

1. Primary; Presentation, mechanism, diagnosis, management, inheritance and incidence.
2. Secondary; Rubella, neurofibromatosis, Sturge Weber syndrome, etc.,

Trachoma

1) Introduction

- Serious health problem in Saudi Arabia.
- Most common cause of treatable blindness in Saudi Arabia
- Afflict 500 million people in the world
- 20 million people are blind from trachoma.
- Cause by chlamydia trachomatitis, which is the most common human pathogen.
- Associate with low socio-economic status.
- Large reservoir in children.
- Transmitted by poor hygiene and crowding, flies and the use of common.

2) Clinically

- Obligate intracellular
- Incubation period: 5-10 days.
- Symptom; Irritation, FB sensation, tearing, mucopurulent discharge.
- Modified MacCallan stages:
  - Immature follicle and early– corneal change.
  - Mature follicles and papillary– hypertrophy and pannus and limbal follicle or Herbert's pits.
  - Conjunctival scarring and mild– activity.
  - Inactive– trachoma.
- Diagnosis of trachoma - 2 of the following:

  NB: The presence of follicles in any combination indicates activity.

  - Active Trachoma: Follicles of palpebral conj.

Limbal follicles

Vascular pannus.

- Inactive Trachoma: Conjunctival scarring

Herbert's pits.

Avascular pannus.

3) Complication and Sequelae

- Eye lid
- Lacrimal apparatus
- Conjunctiva
- Cornea

4) Pathology/Investigation/Vaccination

5)Treatment

Red eye

1.of Red Eye: Conjunctivitis, iritis, keratitis (abrasion and FB), angle closure, glaucoma, corneal ulcer.

Comparing of the following parameters: onset, vision, pain, photophobia, discharge, types of infection, state of the cornea, pupillary size, others.

2. Types of conjunctivitis: DX and management.

Bacterial, chlamydia, viral, allergy including vernal.

3. Types of corneal ulcers: DX and management

Bacterial, Dendritic and Zoster and Fungal.

4. Corneal FB; Welder's keratitis

5. Subconjunctival hemorrhage

Disease of Retina and Choroid

1. Retinal detachment

a) Types:

- Rhegmatogenon
- Exudative
- Tractiona

b) DX and management

c) Predisposing factors: Trauma, myopia, vitreoretinal degeneration (including lattice), aphakia, etc.

2. Diabetes Mellitus

3. Hypertension

4. Retinopathy of prematurity (retrolental fibrop.)

5. Retinal vascular occlusion - artery and vein.

6. Retinitis pigmentosa.

7. Retinoblastoma.

8. Malignant melanoma of the choroid.

9. Choroiditis and retinitis (a few examples, no detail, Toxo and Tb).

Ocular Emergencies

1. Classification including presentation and management.

a) Immediate action (within 1 hour)

· CRAO

· Chemical burn

· Endophthalmitis

b) Very urgent (within 3 - 6 hours)

· Ruptures globe

· Endophthalmitis

· Acute angle closure glaucoma

c) Urgent (within 6 - 24 hours)

· Blunt trauma

- RD
- External ocular infection

2. Selected subjects, presentation and management

a) Corneal abrasion

b) Corneal ulcer

c) Giant cell arteritis

d) Hazardous works and ocular protection

e) Blowout fracture

Strabismus

1. Definition
2. Ocular muscles, innervation and function.
3. Types of ocular deviation: Concomitant and non-concomitant.
4. Diagnosis: Corneal reflection and cover test.
5. Adaptation: Abnormal head position, suppression and amblyopia.
6. Association of strabismus.
7. Therapy.
8. Non comitant and deviation
   - Symptoms
   - Etiology
   - Diagnosis
   - Therapy

Amblyopia

1. Definition

2. Importance of early detection, including visual development

3. Predisposing factors.

4. Presentation and detection.

5. Role of General Practitioner and urgency to refer.

6. Management

Errors of Refraction

1. Principles of optics.

2. Types of retractive errors in myopia, hypermetropia (+aphakia), astigmatism, presbyopia.

- Problem: Symptoms, principles and correction

3. Optical correction:

- Glasses (different types) - C.L. (types)
- IOL (types)- LVA

4. Surgery for refractive errors, R.K., epikeratophakia & PKP.

Systemic Diseases of the eye

1. Include: Endocrine, cardiovascular, connective tissue, muscle, skin, infection and inflammation and hereditary and hematopoetic disorders.

2. Endocrine diseases:

a. Graves disease

b. Parathyroid gland disorder

c. Diabetes Mellitus - Detail/Retina section.

3. Cardiovascular disorder:

a. Aging

b. Hypertensive retinopathy - Detail retina section.

4. Disorders of connective tissue, muscle and skin.

a. Mafran Syndrome

b. Sjogren Syndrome

c. Rheumatoid arthritis

d. Chronic juvenile arthritis (Still's)

e. Ankylosing spondylitis.

f. Giant cell arteritis.

g. SLE

h. Behcet's disease.

i. Reiter's syndrome.

j. Myasthenia gravis

k. Steven Johnson's Syndrome

l. VKH.

5. Infection and inflammation disorders,

a) Syphilis:

- Congenital - triad
- Acquired - 1ry, 2ry, 3 ry

b) TB

c) Leprosy

d) Venereal transmitted diseases:

- chlamydia

  - inclusion conjuctivitis and opthalmia nenonatorum

- viral

- lymphogranuloma venereum

- H. simplex

e) Toxoplasma - Detail in retina section,

f) Toxocariasis.

g) Onchocerciasis

h) Rubella

I) Measles

j) Cytomegalic inclusion disease: congenital / acquired.

k) Adenovirus - PCF & EKC

l) Sarcoidosis

6. Hereditary disorders

a) Trisomy (Down Syndrome)

b) Mucopolysacchoroidosis; e.g. Hurler Syndrome

c) Wilson's disease.

d) Albinism

e) Homocystinurea

f) Galactosaemia

7. Disorders of hematopoetic system

a) Sickle cell anemia

b) Polycythaemia

c) Multiple myeloma

d) Leukemia

Eye care in children and prevention of amblyopia and blindness

1. Introduction

a) Persons responsible about eye care in children

b) Importance of children's eye care

2. Amblyopia: Definition and types

3. Ocular disorders in children leading to amblyopia and blindness: Presentation, management, precautions and prevention.

a) Genetically determined; e.g. cataract, glaucoma, and retinoblastoma

b) Acquired condition; e.g. trauma and infection

c) Others; e.g. retinopathy of prematurity

4.Recommendation and conclusion

Screening of all newborn children at different stages of life is highly recommended to ensure early detection and management of the different disorders that may lead to amblyopia and blindness.

5. Causes of blindness in Saudi Arabia: including percentage of treatable and preventable blindness.

Disorders of the Lens

1. Brief embryology of the lens

2. Brief congenital disorders; e.g. coloboma , etc.

3. Causes of ectopia lentis; e.g. Marfan, Homocrystin urea and trauma.

4. Cataract;

a) Definition

b) Etiology

- Congenital- Inflammatory, e.g. Rubella

  - Metabolic, e.g. Galactosaemia

  - Chromosomal, e.g. Down Syndrome

- Hereditary, e.g. Wilson Disease

- Complicated- Drug induced, e.g. steroid

  - Irradiation

  - Trauma

  - Uveitis

- Senile

c) Management:- Include congenital, unilateral, bilateral and type of surgery

- Adult surgery
- Treatment of aphakia
- Management of amblyopia in children.

5. Lens induced ocular problem.

a) Phacomorphic glaucoma

b) Phacolytic glaucoma

c) Phacoallergic uveitis

d) Posterior subluxation

e) Anterior subluxation

f) Aphakic retinal detachment

Neuro-ophthalmology

1. Applied Neuro anatomy

a) Visual pathway:

- optic nerve, lesion, pappilitis and VF
- Chiasm, lesion, and VF
- Tract, lesion, and VF
- Radiation, lesion and VF
- Cortex, lesion and VF

b) Pupil

- Reflexes; Direct, consentual and near
- RAPD
- Argyl Robertson pupil (light / near dissociation)
- DDX of Anisocoria

Miosis: Drugs,– inflammation, sleep, Horner's syndrome, syphilis and pontine hemorrhage.

Mydriasis: Drugs,– trauma, angle closure glaucoma, midbrain lesion and Cr.III nerve palsy.

c) Motor nerves

- Cr. III n. palsy; Difference between posterior communicating aneurysm and D.M.
- Cr. IV n. palsy
- Cr. VI n. palsy; False localizing in increased ICP, DM and S. hypertension. part of sign of cerebello pontine angle tumors.
- Cr. VII n. palsy: Exposure keratitis, Bell's phenomenon.

2. Raised I.C.P. and papilloedema

- Space occupying lesion and cerebro.
- Difference between papilloedema and papillitis.

3. Cerebrovascular disorders and ocular signs.

- Atheroma of carotid -- unilateral amaurosis fugax, CRAO and BRAO.
- Atheroma of basilar system -- bilateral amaurosis fugax, cortical blindness.
- Aneurysm of posterior communicating artery -- complete painful Cr. III n. palsy
- Aneurysm of carotic in cavernous sinus -- carotid cavernous fistula -- pulsating proptosis.
- Carotid sinus thrombosis.
- Giant cell arteritis -- Ischaemic optic neuropathy.

Leukocoria

1. Definition: White pupil and importance

2. Retinoblastoma, cataract, retinopathy of prematurity, PHPV, etc.

3. Management

Proptosis

1. Definition

2. DX of proptosis and R/O pseudo proptosis condition.

3. DDX of proptosis in children - investigation and management.

i.e. orbital cellulitis, opt. n. glioma, rhabdomyosarcoma, neuroblastoma, leukemia, capillary haemangioma.

4. DDX of proptosis in adults - investigation and management.

i.e. Graves disease, meningioma (opt. n. sheath and sphenioda) cavernous haemangioma, carotid cavernous fistula, carotid sinus thrombosis.

5. Classification of proptosis depending on direction: axial, upward, down and medially, down and laterally.

6. Classification of proptosis depending of bilaterality: Graves disease, carotid cavernous fistula, carotid sinus thrombosis, neuroblastoma, leukemia.

Ocular Toxicology

1. Complication of topical administration:

- mechanical
- pigmentation
- ocular injury: e.g. topical anesthetic or preservative
- sensitivity
- comparison between topical and systemic use of dose

2. Ocular reaction of syst. drug:

- ethyl alcohol
- methyl alcohol
- chloroquine
- ethambutol
- contraception pill
- hypervitaminosis A and hypovitaminisis A

Ocular pharmacology, drug toxicity and proptosis

1. Ocular Pharmacotherapeutics

a) Chrolinergic Stimulating Drugs:

- Local effect
- System effect

i) Direct acting:

- e.g. Miochol
- e.g.– Pilocarpine - mechanism of action in both angle closure and
- open– angle glaucoma.

ii) Indirect acting

- Reversible–
- Irreversible; e.g.– phospholine iodide with action, side effect and precautions.

iii) Cholinergic blocking agents:

- Mechanism–
- Ocular– effect
- Systemic– effect
- Examples of drugs and duration of action.
- Atropine, Scopolamin, Homatropine, Cyclopentolate and Tropicamide

b) Adrenergic compounds

- Adrenergic stimulating:
  - e.g.– Epinephrine, Propine, Phenylephrine
- Adrenergic blocking
  - e.g.– Timolol - effect, mechanism, side effects.

c) Carbonic Anhydrase Inhibitor.

- Effect, side effect and type

d) Osmotic agent.

- Mechanism, therapy and drugs.

e) Anti-inflammatory

- Glauco corticoid– (therapy, side effect)
- Antihistaminic,– sodium

f) Antibiotics

- Penicillin,– Cephalosporin, Aminglycoside, Tetracyclin,
- Chloramphenicol–
- Effect, side– effect.

g) Ocular mycosis chemotherapy

- Amphotericin B,– Nystatin, Natamycin

h) Anti viral.

l) Local anesthetic - topical, infiltration, effect and side effect, manifestation of syst. toxicity,

j) Dye: Flourescein & Rose bengal.