

**CURRICULUM**  
for  
**Certificate**  
in  
**Ophthalmic Science**  
(Second and Third Years)



Council for Technical Education and Vocational Training

**Curriculum Development Division**

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## **Background**

Government of Nepal has called for the provision of basic health care for all persons by establishing a network of services in remote villages and urban population centers. The Council for Technical Education and Vocational Training (CTEVT) has been contributing towards the development of different level of health personnel. In this context, CTEVT has planned to produce middle level Eye Health Cadre **Ophthalmic Assistant** with a view to provide curative, preventive and promotive eye health services to the community.

Initially this cadre of human resource were used to certify through CTEVT/Skill test department and considered as a vocational training. This kind of certification though was catering the immediate need of eye care programme in the country, the trained ophthalmic assistant has limited horizon to grow and limited career ladder to upgrade themselves. This has contributed for the increasing demand of academic training which will allow them to grow further after completion of this certificate level course. In this regards, the CTEVT has decided to start certificate level programme leading to degree “Certificate in Ophthalmic Science” to the candidates who successfully complete the requirements as prescribed by the CTEVT.

The trained Ophthalmic Assistant is a professional Ophthalmic Health Worker, who has been given three full years training in Ophthalmology and related health sciences. The aim of this three years training is to produce compassionate mid level ophthalmic human resource who can help and play important role in eye care delivery system within the hospital and in the community.

The graduates would be eligible for registration with the Nepal Health Professional Council in the category as mentioned in the Act of the Council. The registered graduates would be then eligible for the job at different level health institutions to the position as prescribed by the Public Service Commission or the concerned authority.

## **Mission of the Curriculum**

The mission of the curriculum is to educate and train the quality middle level ophthalmic health personnel equipped with sound knowledge and skills of Ophthalmology along with general medicine.

## **Strategy**

The strategies to achieve our mission of educational excellence will be attained by maintaining expert faculty, implementing a sound curriculum, and recruiting quality students.

## **Philosophy**

The philosophy of the curriculum should be based on the development of both clinical and public health service provider as a profession for fulfilling the health needs of the people with its socio-cultural impact on health. It should be based on code of conduct of Nepal Health Professional Council. The approach should focus on providing curative, preventive and promotive primary eye health services in better way.

## **Program Description**

This course is based on the job required to perform by a middle level Ophthalmic health personnel at different level eye/health institutions in Nepal. The Certificate in Ophthalmic Science on Ophthalmology program extends over three years. The first year focuses on basic sciences and foundational subjects, the second on medical sciences, and the third year is given to the application of learned theory and skill development within comprehensive practice settings, both hospital and community.

## **Aim and Objectives**

The course aims to produce middle level Ophthalmic personnel with equipped sound knowledge and perfect skills of Ophthalmology along with knowledge and skills of general medicine at the level they are aimed at.

The course enable students:

- ❖ To acquire sound knowledge and perfect skills of Ophthalmology and general medicine
- ❖ To demonstrate competency in identifying and resolving community health problems by applying Ophthalmic and modern procedure and medicines taking in consideration of nature of the diseases and condition of the patients

- ❖ To demonstrate basic knowledge and clinical skills necessary to diagnose and manage primary eye/health problems of patients
- ❖ To exhibit leadership skills and professional characteristics and attitudes required as the role of Ophthalmic health personnel or primary eye/health care manager.
- ❖ To demonstrate the necessary knowledge and skills to work in a variety of eye/health care settings
- ❖ To promote Ophthalmology system of medicine with modern knowledge and skills

## Conceptual Framework

The course should reflect:

- ❖ The need of ophthalmic service in proper care of a eye patient.
- ❖ The need of proper curative, preventive and promotive care services in improving Ophthalmic and general medicine
- ❖ The respect gained from the community through professional service
- ❖ The roles and responsibilities of Ophthalmic health personnel to improve the eye/health care system
- ❖ The development of professionalism in Ophthalmology sector by addressing simple to complex ideas those are associated with epistemology, ontology and methodology in Ophthalmic and general medicine

## Target group

SLC pass youths

## Group size

40 nos. in a batch

## Entry criteria

The entry criteria are:

- SLC with minimum of 45% in aggregate with English, Science and Mathematics as compulsory subjects or as per CTEVT entrance policy
- Candidates who pass SLC with optional Ophthalmology will be preferable
- Should pass entrance examination administered by CTEVT
- Final selection will be made on the basis merit list.
- Candidates should submit the following documents at the time of application
  - SLC pass certificate
  - Character certificate
  - Citizenship certificate (for the name, parents' name, age, date of birth and address verification purpose only)
- Student quota for different category of students as per the policy of CTEVT

## Medium of Instruction

The medium of instruction will be in English and/or Nepali language.

## Course Duration

The Certificate in Ophthalmic Science (Ophthalmology) program extends over three academic years. One academic year consists of maximum of 39 academic weeks and one academic week consists of maximum of 40 hrs.

## Pattern of Attendance

Students should have 90% attendance to appear in annual and final examination.

## Teacher and Student Ratio

- ❖ Overall ratio of teacher and student must be 1:10 (at the institution level).
- ❖ Teacher and student ratio for practical demonstration 1:10
- ❖ Teacher and student ratio for bench work 1:5
- ❖ Minimum of 75% of the teachers must be fulltime.

## Program Coordinator, Teacher and Demonstrator

The qualifications of the program coordinator, teacher and demonstrator are:

- ❖ The program coordinator must be a master degree holder in related field or an Ophthalmology/MSc in Ophthalmology degree holder with minimum of 3 years experience in teaching activities or services after completion of bachelor degree.
- ❖ The teacher must be a bachelor degree holder in related field.
- ❖ The demonstrator must have an intermediate level degree in related field with minimum of 2 years experience in teaching activities.
- ❖ The basic science and general subjects teachers must have a master degree holder in the related discipline.

## Instructional Media and Materials

The following instructional media and materials are suggested for the effective instruction and demonstration.

- ❖ **Printed Media Materials** (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- ❖ **Non-projected Media Materials** (Display, Models, Photographs, Flip chart, Poster, Writing board etc.).
- ❖ **Projected Media Materials** (Opaque projections, Overhead transparencies, Slides, LCD, etc.).
- ❖ **Audio-Visual Materials** (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- ❖ **Computer-Based Instructional Materials** (Computer-based training, Interactive video etc.).

## Clinical and Comprehensive Field Practice/Study

The details of professional practice and field visit are as follows:

- ❖ Consists of 75 days and 15 days for clinical and comprehensive field practice
- ❖ Clinical and comprehensive field practice should be conducted in Eye Hospital, Primary Eye Care Centre, Eye Camps, Community based eye care programmes on the rotation basis
- ❖ There should not be more than 10 students in a single hospital and 4-5 students in per Primary Health Care Centre, Health Post and Eye Centre at a time.
- ❖ During the period of clinical and comprehensive field practice there should be at least one teacher with full disposal (either from health facility or training institution).

## Teaching Learning Methodologies

The methods of teachings for Certificate in Ophthalmic Science (Ophthalmology) program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork, Laboratory observation, Hospital visit, Report writing, Term paper presentation, Case analysis, Tutoring, Role-playing, Heuristic and Other Independent learning.

- ❖ Theory: Lecture, Discussion, Assignment, Group work.
- ❖ Practical: Demonstration, Observation and Self-practice.

## Disciplinary and Ethical Requirements

- ❖ Intoxication, insubordination or rudeness to peers will result in immediate suspension followed by review by the disciplinary review committee of the school/institute.
- ❖ Dishonesty in academic or practice activities will result in immediate suspension followed by administrative review, with possible expulsion.
- ❖ Illicit drug use, bearing arms on campus, threats or assaults to peers, faculty or staff will result in immediate suspension, followed by administrative review with possible expulsion.

## Evaluation Scheme

### a. Internal assessment

- ❖ There shall be a transparent evaluation system for each subject both in theory and practical exposure.
- ❖ Each subject will have internal evaluation at regular intervals of 4 months and students must get the feedback about it.
- ❖ Weightage of theory and practical marks will be 20% and 40% respectively.

- ❖ Clinical assessment format must be developed and applied by the evaluators for evaluating student's performance in each subject related to the clinical experience.

**b. Final examination**

- ❖ Weightage of theory and practical marks will be **80% and 60% respectively**.
- ❖ Students must pass in all subjects both in theory and practical to qualify for certification. If a student becomes unable to succeed in any subject s/he shall appear in the re-examination as administered by CTEVT.
- ❖ Students shall be allowed to appear in final examination only after completing the internal assessment requirements.

**c. Requirement for final practical examination**

- ❖ Qualified Eye doctor/relevant subject teacher must evaluate final practical examinations.
- ❖ One evaluator in one setting can evaluate not more than 20 students in a day.
- ❖ Practical examination should be administered in actual situation on relevant subject with the provision of at least one internal evaluator from the concerned or affiliating institute led by external evaluator nominated by CTEVT.
- ❖ Provision of re-examination shall be as per CTEVT policy.

*Note: The evaluation and marking schemes for the subjects clinical and comprehensive field practice/study are mentioned separately in the respective sections of the curriculum.*

### **Pass Marks**

The pass marks for theory and practical examinations are:

- ❖ 40% in theory examination
- ❖ 60% in practical examination

### **Grading System**

The following grading system will be adopted:

- ❖ Distinction: 80% or above
- ❖ First division: 65% or above
- ❖ Pass division: Pass aggregate to below 65%

### **Certificate Award**

The council for technical education and vocational training will award certificate in "**Certificate in Ophthalmic Science (Ophthalmology)**" to the candidates who successfully complete the requirements as prescribed by the CTEVT.

### **Career Path**

The graduates would be eligible for registration with the Nepal Health Professional Council in the category as mentioned in the Act of the Council.

The graduates would be eligible for the position to work at different level of eye/health institutions as prescribed by the Public Service Commission or the concerned authorities.

**Course Structure of Certificate in Ophthalmic Science**  
**First Year (Common for all Health Sciences Programmes)**

S. N.	Subjects	Mode		Week ly Hour s	Distribution of Marks						Total Marks
		T	P		Theory			Practical			
					Internal	Final	Time (Hrs)	Internal	Final	Time (Hrs)	
1	English	3	-	3	20	80	3	-	-	-	100
2	Nepali	3	-	3	20	80	3	-	-	-	100
3	Social Studies	3	-	3	10	40	3	-	-	-	50
4	Anatomy & Physiology	3	2	5	16	64	3	8	12	3	100
5	Physics	3	1	4	16	64	3	8	12	3	100
6	Chemistry	3	2	5	16	64	3	8	12	3	100
7	Zoology	3	2	5	16	64	3	8	12	3	100
8	Botany	3	1	4	16	64	3	8	12	3	100
9	Mathematics, Statistics & Computer Application	3	2	5	16	64	3	8	12	3	100
<b>Total:</b>		<b>27</b>	<b>10</b>	<b>37</b>	<b>146</b>	<b>584</b>		<b>48</b>	<b>72</b>		<b>850</b>

**Second year**

S. No.	Subjects	Mode		Weekly Hours	Distribution of Marks						Total marks
		T	P		Theory			Practical			
					Internal	Final	Time (Hrs)	Internal	Final	Time (Hrs)	
1	Ocular Anatomy and Physiology	4	2	6	20	80		20	30		150
2	Ocular pharmacology and pathology	2	2	4	10	40		20	30		100
3	Systemic diseases related to eye	4		4	20	80					100
4	Ocular Disorders	4	2	6	20	80		20	30		150
5	Optics, refraction, Orthoptics and Low vision	4	2	6	20	80		20	30		150
6	Investigative Ophthalmology	2	1	3	8	32		4	6		50
7	Ocular Surgery	4	1	5	16	64		8	12		100
8	Community Ophthalmology	2		2	10	40					50
<b>Total</b>		<b>26</b>	<b>10</b>	<b>36</b>							<b>850</b>

**Third year**

S. No.	Subjects	Mode		Weekly Hours	Distribution of Marks						Total marks
		T	P		Theory			Practical			
					Internal	Final	Time (Hrs)	Internal	Final	Time (Hrs)	
1	Health Management, basic health care and Health Education	4		4	10	40		20	50		100
2	Ocular Injuries and Emergencies	4		4	20	80					100
3	Research Methodology and Community Diagnosis	2	1	3	8	32		4	6		50
4	a) Clinical Practice (Hospital Based)* Vision, Refraction, Low Vision, Orthoptic, Ocular procedures and Investigations		10	10				100	100		200
	b) Clinical Practice (Hospital Based)* Patient Examination and Diagnosis, Counseling, Ocular Anesthesia, Assist in Surgery, (Preoperative Postoperative Management) Sterilization,		10	10				100	100		200
	c) Clinical Practice (Diagnostic and Screening Camp, Surgical Camp, School Screening, District Eye Care Centre)		8	8				100	100		200
<b>Total</b>		<b>10</b>	<b>29</b>	<b>39</b>							<b>850</b>



# Ocular Anatomy and Physiology

Total: 5 hrs/ w  
Theory: 3 hrs/ w  
Practical: 2 hrs/ w

## Course description

The course aims to make the students to be well versed with the basic knowledge of the anatomy and physiology of the eye so that they can understand and explain what is a normal eye and its structures and functions and how to differentiate it from the abnormal conditions.

## Course objectives

- a. The students will acquire the knowledge of embryology of the eye, anatomy of eye lids and adnexa, conjunctiva, cornea, sclera, uveal tract, lens, vitreous humor and retina, and be able to explain them.
- b. The students will acquire the knowledge of physiology of cornea, aqueous humor, metabolism of cornea, lens and vitreous, and be able to explain them.

## Course Contents

### Part 1: Ocular Anatomy

#### Theory

#### Unit 1. (Ocular embryology: 10 hrs

- Explain development of different parts of eye, e.g. sclera, cornea, iris, lens, vitreous, retina with its nerve and blood supply.

#### Unit 2. (Anatomy of eye ball, its content and visual pathways: 40 hrs

- Describe various planes and surfaces and anatomical terms.
- Explain anatomy of conjunctiva, cornea and sclera, and their blood and nerve supply.
- Describe anatomy of iris, ciliary body and choroid,
- Describe anatomy of lens, vitreous body and retina
- Describe anatomy of optic nerve, optic chiasm and visual cortex and its blood supply

#### Unit 3. Ocular Adnexa 50 hrs

- Describe boundary of orbit and its wall: structures and formation of orbit and its components, superior orbital fissure, inferior orbital fissure, foramina
- Explain ocular muscles origin, insertion, blood and nerve supply: orbicularis oculi, LPS, SR, MR, IR, LR, SO, IO, ciliary muscles, sphincter pupillae, dilator pupillae.
- Describe function of 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> cranial nerve and its relation to eye.
- Explain different structures ( skin, muscles, tarsal plate, tarsal glands, nerve and blood supply) and function of eye lid.
- Describe anatomy of lacrimal drainage system.

#### Practical

Wet lab practical in pigs eye and in goat eye; Perform dissection and explain different part of eye anatomy - **57 hours**

Practical in mannequin and in model of eye ball; explaining different part of human eye: **21 hrs**

The explanation should include the eye lids, glands, tear circulation, Cornea, Conjunctiva, Sclera, Aqueous humour, vitreous humours, Iris and Uveal tract, Retina, Optic nerve, extra ocular muscles and orbit.

## Part 11: Ocular Physiology Theory

### Course Description:

The course includes the basic physiological knowledge of the eye and provides the students with effective investigative skills in Ophthalmology.

Course objectives:

After the completion of this chapter, the students will be able to understand and explain the subject matter taught under the following enlisted course content.

### Course Content

#### Theory

#### Unit 1. Dynamics of aqueous humour

25 hrs

- a. Describe formation of aqueous humor and drainage through pupil, AC, filtration angle; (trabecular meshwork, schlemm,s canal and episcleral veins), function of aqueous humor, normal Intra Ocular Pressure (IOP)
- b. Explain metabolism of cornea, lens nutrition of different structures, action of drugs on the intraocular musculature

#### Unit 2. Physiology of vision:

25 hrs

- a. Explain physiology of vision, visual perceptions - light sense, form sense, color sense. sense of contrast, binocular vision, visual field.
- b. Describe neurophysiology of vision (visual pathways: pupillary pathways, light reflex, accommodation reflexes, action of drugs on the intraocular musculature

#### Unit 3. Tear dynamics:

6 hrs

- a. Explain tear production, tear film formation, lacrimal pump and function of tear film

# Ocular Pharmacology and Pathology

Total: 4 hrs/ w  
Theory: 2 hrs/ w  
Practical: 2 hrs/ w

## Course description

The course provides basic concepts on pharmacy, pharmacology and pathology with special reference to eye. The students will acquire knowledge on the selection of appropriate drugs for specific diseases/conditions, their actions, indications, contraindications and side effects and basic introduction to clinical pathology that deals about medical microbiology and biochemistry with special reference to ocular pathology.

## Course objectives

After the completion of this subject, the students should have knowledge and be able to;

- name the common microorganisms.
- perform and explain corneal scraping and inoculate in different culture media
- Explain ocular microbiology and should also be able to perform and explain diagnostic laboratory techniques like Gram staining, Geimsa staining and KOH mount.

Course Contents :

## Theory

### Part 1: Ocular Pharmacology

#### Unit 1. (Pharmacy and pharmacology)

19 hrs

1. Describe Pharmacy, Pharmacology, Drug, Pharmacodynamics, Pharmacokinetics, adverse reactions, dose, indications, contraindications, preparation and dispensing, expiry date and self-life.
2. Explain broad classification of drugs according to sources and examples of each class of drugs
3. Describe routes of drug administration and the factors affecting drug action.
  - Explain the fate of the drugs in the body
  - Explain the importance of shelf-life of drugs and its expiry date.

#### Unit 2 (Drugs and their actions)

20 hrs

6. Describe drugs and the law
7. Explain dispensing and pharmacy techniques
8. Describe the composition, action, route of administration, indication, contraindication, dose, side effects of analgesics, antipyretics and anti-inflammatory drugs (steroidal & non steroidal).
9. Describe the composition, action, route of administration indication, contraindication, dosages, side effects of antibiotics, antivirals, antifungals, corticosteroids, anti glaucoma, lubricants, miotics, mydriatics, cycloplegics, cyto toxics, antiseptics, anaesthetics analgesic, antipyretics.
10. Describe drugs used in common respiratory problems

11. Explain drugs used in common GI problems
12. Explain drugs used in common cardiac problems
13. Explain drugs used in common neurological problems
15. Nutritional supplements

**Practical: 39 hrs**

**Unit 1.**

- 1) Explain prescription and dispensing techniques
- 2) Perform pharmacy techniques

**Part 11: Ocular Pathology: 39 hrs**

Course contents:

**Theory**

**Unit 1. (Ocular microbiology)**

**12 hrs**

1. Describe microorganisms (bacteria, fungus, virus, Chlamydia) and micro biology
2. Enlist the media used in bacterial and fungal cultivation and identification techniques, and sensitivity testing methods

**Unit 2. (Parasitology)**

**7 hrs**

1. Describe types of parasites and their identification

**Unit 3. (Hematology)**

**9 hrs**

1. Describe blood and structure and functions of blood
2. Describe TLC, DLC and ESR of blood with normal values

**Unit 4. (Asepsis and sterilization)**

**10 hrs**

1. Describe sterilization and methods of sterilization

**Practical**

**39 hrs**

1. Perform microscopic examination of stained slides and maintenance of laboratory equipments
2. Perform TLC, DLC and ESR of blood with normal values
3. Perform slide preparation
4. Prepare culture plates
5. Perform gram stain, geimsa stain,

# Systemic diseases related to eye

Total: 4 hrs/ w  
Theory: 4 hrs/ w  
Practical: 0 hrs/ w

## Course description

This course will provide the students with concepts and ideas of diseases in general medicine related to eye.

## Course objectives

- At the end of the course the students should have knowledge of and be able to explain the systemic diseases related to eye like hypertension, diabetes mellitus, thyroid disease , connective tissue diseases

## Course Contents

### Theory

1. Explain introduction, history, aetiology, symptoms, signs, and effects on the eye and its initial management in: **156 hrs**
  - a) Diabetes Mellitus
  - b) leprosy
  - c) syphilis
  - d) Tuberculosis
  - e) hypertension
  - f) Thyroid disorders
  - g) Gonorrhoea
  - h) Rheumatoid Arthritis
  - i) Toxoplasmosis
  - j) Rubella
  - k) Measles
  - l) Malabsorption
  - m) Malnutrition
  - n) Anaemia
  - o) HIV/AIDS
  - p) Toxemia of pregnancy

- q) Marphan Syndrome
- r) Vitamin deficiencies

# Ocular Disorders

**Total: 6 hrs/ w**  
**Theory: 4 hrs/ w**  
**Practical: 2 hrs/ w**

## Course description

This course provides knowledge to the students regarding the signs, symptoms and management of the eye disorders.

## Course objectives

After the completion of this course, the students should be able to diagnose and explain the ocular disorders and manage them and refer whenever necessary.

## Course Contents

### Theory

#### Unit 1 Extra-ocular disorder: 50 hrs

1. Describe etiology sign symptom, provisional diagnosis and management of the following condition/disorder of eye lids: Chalazion, stye, blepharitis, meibomitis, trichiasis, entropion, ectropion, ptosis, symblepheron, herpes zoster, molluscum contagiosum, lid tumors, congenital anomalies.
2. Explain etiology sign symptom, provisional diagnosis and management of disorders of the conjunctiva and condition which require referral; Conjunctivitis (bacterial, viral, chlamydial, allergic), trachoma, pterygium, pinguecula, dermoid, conjunctival degenerations.
3. Describe etiology sign symptom, provisional diagnosis and management in the disorder of and conditions which requires referral; Corneal ulcer (bacterial, viral and fungal), keratitis, developmental anomalies (microcornea, megalocornea) and keratoconus

#### Unit 2 Disorder in ocular coat and contents: 54 hrs

1. Describe etiology sign symptom, provisional diagnosis and management of the disorder of lens and condition which requires referral for surgery: cataract, congenital anomalies (lens coloboma, lenticonus, lentiglobus), subluxation, dislocation.
2. Explain etiology sign symptom, provisional diagnosis and management of disorder of uveal tract and condition which requires referral: Iritis, cyclitis, iridocyclitis, choroiditis and pars planitis
3. Explain etiology sign symptom, provisional diagnosis and management of the disorder in aqueous drainage system (glaucoma) and condition which requires immediate referral; Congenital glaucoma, angle closure glaucoma, open angle glaucoma
4. Explain etiology sign symptom, provisional diagnosis and initial management of disorder of retina and macula (refer if necessary): Retinal detachment, retinitis pigmentosa, macular edema, macular hole, macular degeneration
5. Enumerate etiology sign symptom, provisional diagnosis and initial management of disorder of optic nerve and condition which requires immediate referral: Optic neuritis, optic atrophy, disc edema



**Unit 3 Ocular disorder (general): 52**

9. Diagnosis of different types of squint (refer if necessary): Eso. Exo, and hyper deviations, concomittant/inconcomittant squint
10. Diagnosis of amblyopia and refer with initial managment
11. Common orbital disorders (refer if necessary)Preseptal cellulitis, orbital cellulitis, proptosis, cavernous sinus thrombosis
12. Diagnosis and treatment of common lacrimal diseases (refer if necessary) Dacryocystitis, dacryoadenitis, canaliculitis.
13. Common foreign bodies in eye (refer if necessary)
14. The congenital anomolies of the eye (refer if necessary) Anophthalmos, microphthalmos, aniridia, iris coloboma, albinism,
15. Toxic effects of drugs on the eye (refer if necessary)
16. Explain initial management of ocular emergencies and enlist the condition which require immediate referral: Mechanical injury, chemical injury, acute angle clousure glaucoma, retinal detachment with macula on, central retinal artery occlusion
17. Explain etiology sign and symptom of endophthalmitis/panophthalmitis and refer with initial management.

**Practical:**

**Unit 1 Anterior segment examination:**

**39 hrs**

1. Ocular screening room: Examination with Torch lights, binocular loupe, Slit lamp

**Unit 2 Ocular content / Media and Posterior Segment and examination room (39 hrs)**

1. Ocular examination using torch light, Slit lamp with 90 D lens, Direct ophthalmoscopy, indirect ophthalmoscopy

# OPTICS, REFRACTION, ORTHOPTICS AND LOW VISION

Total: 6 hrs/ w  
Theory: 4 hrs/ w  
Practical: 2 hrs/ w

## Course description

This course provides the students with knowledge and skills on optics, refraction, orthoptics and low vision. The course is designed to develop basic but comprehensive knowledge of principles, laws of the optics and refraction. Moreover, it will help to learn fundamental procedures used in refraction, orthoptics and low vision.

## Course objectives

After the completion of this course the student will be able to:

1. Explain basic principles and laws of refraction and optics
2. Classify and explain the different types of lenses, low vision devices and their properties
3. Differentiate and explain different types of ametropia with classification and their management
4. Explain basic procedures to calculate accommodation, convergence, heterophoria and heterotropia
5. Define, Classify and manage amblyopia
6. Perform clinical assessment, functional assessment and rehabilitation of low vision clients

## Course Contents :

### Theory

#### Unit 1 Optics and Refraction (116 hours)

1. Describe different theories of light, principle of reflection, refraction, sign convention.
2. Explain structure of retinoscope and optical principle of retinoscopy
3. Describe refraction and reflection through plane surface, spherical surface and spherical lenses.
4. Explain cardinal points of a lens system and calculation in different type of lenses.
5. Describe ray diagram of image formation on lens system.
6. Calculate focal length of thin/thick concave lens and convex lens. Finding out the position and size of the image using formulae.
7. Describe types of lenses like spherical, cylindrical, compound, multifocal, progressive, quality of optical lenses and manufacturing process.
8. Explain best form of lenses, absorptive lenses, meniscus lenses, aniseikonic lenses.
9. Describe the principle of schematic eye and different parameters of it.
10. Explain determination of the power of the lenses by lensometry, neutralization, spherometry.
11. Explain lens effectivity, field of vision and types of optical aberration with its management.
12. Describe different methods objective refraction using , principles and procedures.
13. Explain different methods of subjective refraction using duochrome, Jackson cross cylinder, astigmatic fan.
14. Describe emmetropia and ametropia, their signs, symptoms, etiology and management.
15. Describe types of contact lens, solution, it's indication and contra indication
16. Describe the ocular complication in contact lenses with their management.

#### Unit 2 Orthoptics (20 hours)

1. Describe convergence and accommodation with their anomalies and management techniques.

2. Classify different types of misalignment of eyes: describe phorias, tropias, concomitant, inconcomitant and their measurement techniques and management.
3. Describe amblyopia, types, causes and management methods of amblyopia.
- 4.

### **Unit 3 Low Vision (20 hours)**

1. Define low vision (functional and clinical).
2. Explain causes of low vision and its practical implications (visual simulations)
3. Describe classification of functional visual deficit
4. Explain types of optical and non optical devices
5. Explain power calculation and prescription of low vision devices.
6. Describe basic methods of management and rehabilitation of low vision clients

## **Practical**

### **Unit 1 Optics and Refraction**

**48 hours**

1. Use candle, plane mirror, concave lens, concave mirror, convex mirror, convex lens to show image formation.
2. Determine the focal length and the power of the spherical lens and mirror.
3. Use retinoscope to observe the glow in schematic eye and human eye.
4. Determine the neutralizing lens power and calculation of the refractive error.
5. Observe the different types of lenses. Measurement of their thickness, radius of curvature by using microspherometer.
6. Determine the power of spherical lens, compound lens by lensometer and neutralization method.
7. Perform subjective refraction by using pinhole, duochrome, Jackson cross cylinder, astigmatic fan and stenopaic slit.

### **Unit 2 Orthoptics**

**15 hours**

1. Measurement of amplitude of accommodation and convergence by using RAF rule.
2. Use different methods to distinguish phorias and tropias.
3. Describe measurement of the degree of deviation of eye.

### **Unit 3 Low Vision**

**15hours**

1. Measure visual acuity of low vision client in different contrast using Log MAR chart
2. Assess optical/non optical devices for low vision clients.
3. Provide practical advice to clients, teachers, carers and others about interventions and follow up needed

#### ***Reference books:***

1. Clinical Optics, Fannin TE and Grosvenor, 1996
2. Clinical Visual Optics, Bennett AG and Rabbetts RB, 1997
3. Principles of Ophthalmic Lenses, Jalie M
4. Refraction, Duke Elder
5. Dictionary of Optometry, Millodot. M., 1993
6. Binocular Vision and Ocular Motility, Von Noorden 5<sup>th</sup> edition.
7. Primary Care Optometry, Grosvenor TP, 1996
8. Clinical Low Vision, Faye E, Little Brown and company, 1984
9. The Low Vision Handbook, Barbara Brown
10. Aankha: Samanya Janakari

## INVESTIGATIVE OPHTHALMOLOGY

**Total: 3 hrs/w**  
**Theory: 2 hr/w**  
**Practical: 1 hr/w**

### Course description

This course provides the students with the basic knowledge and skill required to carryout the important investigations in ophthalmic practice. These skills will help the students to diagnose and / or to manage the ocular disorders.

### Course objectives

After the completion of this course the students will be able to:

1. Measure visual acuity at different distances
2. Perform colour vision test, schirmer test and lacrimal sac syringing
3. Measure and record intra ocular pressure
4. Perform visual field test and ultrasonography.
5. Perform anterior segment photography, fundus photography and fluorescein angiography
6. Perform exophthalmometry, pachymetry, keratometry and gonioscopy.
7. Assist in the examination of the fundus with: 90 D lens, 3 mirror lens and panfunduscope

### Course contents

#### Theory

#### **Unit 1: Visual acuity, color vision and visual field measurement      38 hrs**

1. Explain distance and near visual acuity and its measurement
2. Describe normal & abnormal colour vision and colour blindness
3. Describe normal and abnormal visual field in different ocular disorders and visual field measurement methods.

#### **Unit 2 Tear and Aqueous humour dynamics assessments      14 hrs**

4. Explain tear film assessment method by schirmer and TBUT test.
5. Explain tear drainage system and the different parts involving in tear drainage.
6. Describe normal and abnormal intraocular pressure (IOP) and different techniques of IOP measurement.

#### **Unit 3 Ocular diagnostic techniques      18 hrs**

7. Explain principles and methods of B scan & biometry, keratometry, gonioscopy, pachymetry, exophthalmometry, anterior segment and fundus photography and fluorescein angiography.
8. Describe the techniques of fundus examination with 90D lens, 3 mirror lens and panfunduscope.

#### **Unit 4 Screening of blood pressure and sugar level      10 hrs**

9. Explain normal and abnormal blood pressure at different ages.
10. Explain normal sugar level in blood.

## Practical

### Unit 1 clinical examination

18 hrs

1. Measure visual acuity at near and distance.
2. Perform schirmer I and II tear film test.
3. Test colour vision by using Ishihara plates.
4. Perform lacrimal sac syringing test.

### Unit 2 Diagnostic investigation

21 hrs

5. Carry out visual field tests using Bjerrums screen, Goldmann perimeter, and Humphrey automated field analyzer.
6. Measure intraocular pressure by using Schiottz tonometer and applanation tonometer.
7. Perform B scanning, keratometry, pachymetry, gonioscopy, exophthalmometry and different types of photography.
8. Measure blood pressure.
9. Carry out urine sugar level estimation and blood sugar measurement.

### References

1. Ophthalmic Assistant; Harold A Stein.
2. Practical Ophthalmology; A K Khurana.

# Ocular Surgery

**Total: 5 hrs/ w**  
**Theory: 4 hrs/ w**  
**Practical: 1 hrs/ w**

## Course description

This course provides knowledge and skills to the students about different types of ocular surgical techniques and investigative procedures required to perform during, after and/or before surgery. Likewise, they will also develop knowledge and skills on the ocular surgical producers to assist the Ophthalmologist and on the eligible cases to perform specified surgeries on their own.

## Course objectives

**After the completion of this course the student will be able to**

- a) Prepare and layout the operating theatre
- b) Prepare patient for surgery
- c) Prepare surgical instrument set for different ophthalmic surgeries
- d) Sterilize ophthalmic OT, instrument and equipments required for surgeries
- e) Carryout aseptic procedure during ocular surgery
- f) Assist the Ophthalmologist in different types of ocular surgeries.
- g) Perform different types of ocular surgical procedures (specified) and investigations independently.

## Course Contents

### Theory

**Unit 1: prepare OT trolley, instrumentation, observation and assisting in following intraocular surgery: 100hrs**

- Different method of Cataract surgery including IOL implantation
- Different method of Glaucoma surgery
- Surgery of the naso-lacrimal passage
- Squint surgery
- Keratoplasty
- Vitrectomy
- Retinal detachment
- Lid surgery including ectropion, entropion, ptosis and reconstruction
- Orbitotomy
- Enucleation
- Evisceration
- Exenteration
- Excision biopsy

**Unit 2 preparation of patient, surgical area, steps of surgery, possible complication and their management following extra ocular surgeries: 56 hrs**

- Chalazion incision and curettage
- Entropion correction
- Lid laceration repair (punctum and canaliculi not involved)
- Incision and drainage of lid abscess and hordeolum externum
- Electro epilation for trichiasis
- Pterygium excision

**Practical**

**Unit 1 Preparation of intra ocular OT**

**20 hrs**

Prepare OT for intraocular surgery

Administer Local anaesthesia

Perform Sterilization and instrumentation for intraocular surgery

Perform Pad and bandage

Prepare patient for surgery

Assist. intraocular surgery (Scrubbed and unscrubbed)

**Unit 2 Preparation of OT for septic and extraocular surgery:**

**19 hrs**

Administer Local anaesthesia

Perform Sterilization and instrumentation

Perform Pad and bandage

Preparation of patient for surgery

Assist/perform extra ocular surgery (Scrubbed and unscrubbed)

# Community Ophthalmology

**Total: 4 hrs/ w**  
**Theory: 2 hrs/ w**  
**Practical: 2 hrs/ w**

## Course description

This course provides the knowledge and skill to the students to plan, implement, monitor and evaluate the eye health interventions in defined population.

## Course objectives

At the end of this course the student will have comprehensive idea about the scope of community ophthalmology which includes the assessing community health needs, planing, implementing and carry out evaluation of the health inteventions.

## Course content

### Theory

#### Unit 1 Primary health care

**30 hrs**

- Explain primary health care and its scope.
- Define health and its determinant
- Explain the importance of community participation in health care
- Plan and set priority in health care

#### Unit 2 Global burden of blindness and vision 2020 “The Right to Sight”

**48 hrs**

Describe basic concept, magnitude & management of childhood blinding eye diseases and basic Explain principles of prevention and control of blinding eye diseases, and define magnitude of blindness & poor vision.

- Explain the methods of calculating the burden of diseases and vision impairment at local, national and global level.
- Describe concept, magnitude & management of childhood and adulthood blinding eye diseases at community level.
- Describe concept, magnitude, and management of the communicable and non communicable common ocular disorders such as cataract, trachoma, corneal infections, diabetic retinopathy.



## Health Management and Basic Health Care, and Health Education

Total: 4 hrs/ w

Theory: 4 hrs/ w

Practical: 0 hrs/ w

### Course description

#### Management:

This course will provide the students with the knowledge and skills of management, which are applicable to management in the primary or community eye care centers at different geographical areas of the country

#### Basic Health Care:

This topic provides the students with knowledge in basic health care needs and issues and with beginning skills and human concerns when giving initial assistance or treatment to a casualty of any age for any injury or sudden illness.

Health Education: The students will acquire knowledge and skills on the health education, its purposes, principle and scope, develop and disseminate health education materials and implement health education program.

### Course objectives:

After the completion of this course the student will be able to understand and explain:

#### Management:

#### **Unit 1 Health education concept, method and implementation 76 hrs**

- Describe concepts, principles and scope of management, definition of administration and health management.
- Explain planning of health services
- Organize health services
- Describe staffing aspect of the organizing function
- Describe directing
- Describe coordination in health services
- Describe on reporting
- Prepare budget
- Describe definition of economics, concept and framework of health economics and its significance in health planning and budgeting process in health sector
- Describe book keeping
- Describe auditing
- Describe introduction to inventory management
- Describe meaning, definition, characteristics and types of leadership, types of leaders, qualities of leader

#### **Unit 2 Basic Health Care 42 hrs**

- Define health by WHO/UN
- Describe factors influencing health in Nepal and world community
- Describe the environment, ecology and pollution
- Explain basic Needs of people as formulated by Maslow
- Describe the physiological needs, primary, secondary and aesthetic needs
- Explain five physiologic needs of all people
- Explain survival needs
- Explain significance of the person's basic and secondary needs for the health worker

#### Holistic philosophy of high level wellness

- Develop healthy habits for ownself and others
- Develop healthy habits (food, elimination, exercise, sleep, rest and relaxation, dental care, eye care, posture)
- Describe how one's appearance affects and how one feels
- Explain stress and ways to deal with it
- Describe role of laughter in illness and health

**Unit 3: Eye Health Education**

**38 hrs**

1. Enumerate the methods of delivering health education and its purposes, principle and scope.
2. Identify target groups and collect and prepare health education materials
3. Plan, implement and evaluate health education program
4. Organize primary eye care training activities
5. Explain health education in peripheral level health services
6. Organize awareness creating eye health intervention program

# Ocular Injuries and Emergencies

**Total: 4 hrs/ w**  
**Theory: 4 hrs/ w**  
**Practical: 0 hrs/ w**

## Course description

This course provides the students with knowledge and skills to rule out the possible sites of ocular injuries and their management.

## Course objectives

After the completion of this course the student will be able to:

- a) provide first aid treatment
- b) know when and who to refer
- c) counseling of the patients

## Course Contents

### Unit 1 Ocular FB, Trauma and injury

**78 hrs**

Diagnosing and initiating treatment and making referrals for following ocular emergency: conditions

- ❖ Conjunctival and corneal foreign bodies
- ❖ Intra ocular foreign bodies
- ❖ Contusion of the eye lids
- ❖ Contusion of the globe
- ❖ Penetrating injuries of the eye
- ❖ Laceration of the lids
- ❖ Fractures of the orbit
- ❖ Chemical injuries-acid, alkali
- ❖ Thermal and radiation injuries
- ❖ Injury caused by radiant energy
- ❖ Central retinal artery occlusion

### Unit 2: Sudden loss of vision

**78 hrs**

Diagnosing and initiating treatment and making referrals for following ocular emergency: conditions

- ❖ Acute narrow-angle glaucoma
- ❖ Corneal ulcer
- ❖ Corneal abrasion
- ❖ Acute iritis
- ❖ Retinal detachment
- ❖ Hyphema (hemorrhage in the anterior chamber of the eye)
- ❖ Lid laceration
- ❖ Blow-out fracture of the orbit

# Research Methodology and Community Diagnosis

**Total: 2 hrs/ w**  
**Theory: 1 hrs/ w**  
**Practical: 1 hrs/ w**

## Course description

This course is to provide the student with basic knowledge and skills to design and carry out health survey for assessing the health needs of the defined population.

## Course objectives

At the end of this course the student will have comprehensive idea and be able to explain about historical aspects of health research, common procedures and methodology in descriptive and experimental health research for assessing the health needs of the defined population.

## Course Contents

### **Unit 1 Importance of health research and its type** **18 hrs**

- Define purpose and importance of operational research in health
- Types of research: descriptive, applied, action, operations research, evaluative, survey
- Selection of problem, reviewing the literature, formulation of research objectives

### **Unit 2 Research Designing and data analysis** **32 hrs**

- Design- observational and experimental research
- Sampling methods- probability and non probability sampling methods
- Instrumentation (methods and tools of research)
- Data collection (primary and secondary, qualitative and quantitative)
- Data processing (coding, editing, classification, tabulation, graph)
- Analysis of data and findings

### **Unit 3: Research finding dissemination** **28 hrs**

- Draw the conclusion, summary and recommendations based on the findings
- Definition of community , definition, concept, importance and use of community diagnosis, process of community diagnosis

- FACT- facilities available in the community, attitudes, knowledge, practices, constraints of community diagnosis, training for community people.
- Rapid method and in-depth method and different types of tools for data collection- interview, observation, focus group discussion etc.
- Planning, implementation and assessment of monthly health plan
- Presentation and recommendation of the community health needs

**Practical: 39 hrs**

- Conduct field research and presentation of findings
- Perform Community diagnosis and planning micro health project

**Recommended books:**

1. Kothari, CK "Research Methodology" Wiley Eastern Limited (fourth reprint 1989).
2. Fisher, A Laroing, J ans Stokel, J " Handbook for Family Planning Operations Research Design" Population council, 1991.
3. Basic epidemiology
4. B Kirkood "Medical Statistics"
5. World Health Organization "Community Diagnosis".

# Clinical Practice (Hospital Based)

Total: 20 hrs/ w  
Theory: hrs/ w  
Practical: 20 hrs/ w

## Course description

This course will provide the student holistic approach dealing with patient and managing their eye problem in the hospital which includes examination, investigation, counseling and explanation of treatment procedure and importance of their compliance with the treatment.

## Course objectives

After the completion of this training the student will able to receive the patient, perform ocular examination, process required investigations and be able to initiate appropriate treatment and identify the conditions which require referral for more sophisticated treatment or surgery.

## Course Contents

### Unit 1: Observation and perform the job under supervision in various department of Outpatient Clinic: 230 hrs

- Registration and reporting
- Visual acuity test
- Examination room
- Refraction room
- Specialized clinic: Cornea, Glaucoma, Retina, Oculoplasty, Paediatric
- Procedure room

### Unit 2 Observation and perform the job under supervision in Ocular investigations department: 80 hrs

- Biometry
- Hematology Pathology and microbiology laboratory
- Visual field examination
- Ultra-sonography
- Lensometry, Keratometry, Tonometry
- 

### Unit 3 Other support service: 80 hrs

- Counseling
- Optical dispensing (grinding, edging, fitting)
- Pharmacy

### Unit 4 Observation and perform the job under supervision in various department of In patient Department: 160 hrs

- Admission of patient
- Consent perform prepreparation
- Prepare patient for surgery
- Check required investigation and preoperative management
- Postoperative management
- Patient discharge
- Recording

### Unit 5 Observation and perform the job under supervision in various department of Operating Theatre: 230 hrs

- OT running and record keeping

- Receive the patient in OT and check the patient readiness for surgery
- Preoperative management in OT
- Local Anaesthesia
- Assit unscrub and scrub (Sterile)
- Instrumentation and sterilization
- Operate OT equipment
- Pad and bandage
- Recovery of the patient
- Immediate postoperative management
- OT fumigation and preparation
- Maintain OT record and prepare periodical report
- Inventory and logistics managment

# Clinical Practice

(Diagnosis and screening camp, surgical camp, school screening, and district eye care centre)

Total: 8 hrs/ w

Theory: hrs/ w

Practical: 8 hrs/ w

## Course description

This course will provide the student holistic approach dealing with patient and managing their eye problem in the remote eye centre and mobile community out reach program which includes examination, investigation, counseling and explanation of treatment procedure and importance of their compliance with the treatment.

## Course objectives

After the completion of this training the student will be able to deal with the patient problem at primary eye care centre or in community out reach where all investigations procedure may not be available which includes, ocular examination, and be able to initiate appropriate treatment and identify the conditions which require referral for more sophisticated treatment or surgery.

## Course Contents

### Unit 1: Observation and perform the job with or without supervision in Outpatient Clinic: 120 hrs

- Registration and reporting
- Visual acuity test
- Examination room
- Refraction room
- Procedure room

### Unit 2 Observation and perform the job under with or without supervision in Ocular investigations department: 40 hrs

- Biometry
- Visual field examination
- Lensometry, Keratometry, Tonometry
- 

### Unit 3 Other support service: 40 hrs

- Counseling
- Optical dispensing (edging, fitting)
- Pharmacy

### Unit 4 Observation and perform the job under supervision in various department of In patient Department: 85 hrs

- Admission of patient
- Consent perform preparation
- Prepare patient for surgery
- Check required investigation and preoperative management
- Postoperative management
- Patient discharge
- Recording

### Unit 5 Observation and perform the job under supervision in various department of Operating Theatre: 127 hrs

- OT running and record keeping
- Receive the patient in OT and check the patient readiness for surgery



- Preoperative management in OT
- Local Anaesthesia
- Assist unscrub and scrub (Sterile)
- Instrumentation and sterilization
- Operate OT equipment
- Pad and bandage
- Recovery of the patient
- Immediate postoperative management
- OT fumigation and preparation
- Maintain OT record and prepare periodical report
- Inventory and logistics management

**Ophthalmic Science**  
**Curriculum revision core committee**  
**2010**

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