REVISED / UPDATED CURRICULUM

FOR

BSc. (HONS.) VISION SCIENCES

UNDER NEW REGULATIONS "REGULATIONS 2017"

COLLEGE OF OPHTHALMOLOGY VISION & ALLIED HEALTH SCIENCES, KING EDWARD MEDICAL UNIVERSITY, MAYO HOSPITAL, LAHORE.

PART A

INTRODUCTION

Students of B.Sc. (Hons.) Vision Sciences are supposed to work with a maximum level of effectiveness in professional attitude, maintaining ethical relations, integrity and confidentiality. The professional competence and their clinical performance at all levels will be assured by this designed curriculum in every possible way.

VISION STATEMENT

The graduates of KEMU BSc. (Hons.) program will be able to critically analyze events, information and ideas. They will be lifelong learners equipped with skills to pursue their chosen careers successfully**.**

MISSION STATEMENT

To work towards achieving the vision enunciated through collective effort of faculty, administration and students of the BSc. (Hons.) program by creating an educational environment characterized by academic excellence.

Our objectives are:

- To advance knowledge through creative research and scholarship across a wide range of academic disciplines.
- To extend knowledge through innovative educational programs built on strong foundation in which emerging scholars are motivated to realize their highest potential and assume roles of leadership, responsibility, and service to society.
- To apply knowledge to provide solutions to the problems in order to improve the quality of life and enrich the economy of the nation, and the world.

MISSION OF THE FACULTY

- Faculty integrates basic and visual sciences in a compelling, case-based format with clinical applications. Basic science courses set the stage for primary eye care. Students learn about the key areas of primary eye care: anterior and posterior segment conditions, oculo-systemic disease, neuro-ophthalmic disease, contact lenses, pediatrics, vision training and perception, low vision, orthoptics and more.
- The courses are taught by world-renowned clinicians, researchers and educators who are leaders in their fields.
- The mission of the College of Ophthalmology & Allied Vision Sciences is to prepare, educate and train Optometric physicians, Orthoptist and Investigative Oculist to practice at the highest level of proficiency, integrity, and professionalism; and to provide a multidisciplinary environment that encourages scholarly activity, service, and lifelong learning.

We accomplish our mission through; providing high quality optometric, orthoptic and Investigative Oculist's education which will prepare graduates to provide full-scope services in an ethical and professional manner.

- College of Ophthalmology & Allied Vision Sciences span the clinical, didactic and service missions. We strive for our students to be of the highest caliber and be able to obtain the highest level of skill and education needed to serve their patients and communities upon graduation.
- Acquire a sound foundation in basic and clinical sciences.
- Learn the technical, communicative, and interpersonal skills required to apply that knowledge.
- Develop self-confidence in decision-making, acceptance of responsibility and characteristics of a professional person.
- Become involved in discovery, transmittal, and application of knowledge through participation in, or appreciation of, scientific inquiry.

Be exposed to, and made aware of:

- The ethical insights and moral attitudes required to ensure that the best interests of the patient are served.
- The forces--legislative, legal, ethical, technical and socioeconomic--which influence health care.
- The necessity of keeping abreast of new knowledge and technology and their applications as a continuing obligation to patients and their care.
- To involve faculty and students in leadership roles in organizations.
- To become a resource for health information for the general public and be pro-active in creating venues for the dissemination of this information.
- To assist the international Vision Science community in the development of professional education and standards for eyecare health.
- Providing an Optometric, Orthoptic and Investigative Oculist foundation on which graduates will continue to build expertise and knowledge.
- The program will prepare graduates to contribute to the advancement of the Optometric, Orthoptic and Investigative Oculist profession.
- Encourage students to develop an interest in leadership roles within the Optometric, Orthoptic and Investigative Oculist profession and a concern for the highest quality of care given by the profession in Pakistan.
- To train and produce Eyecare professionals with scientific and professional standards who will be capable of functioning and competing internationally.
- Teaching students about the role of other healthcare providers and the importance of a holistic and co-operative approach to eye and vision care.

MISSION OF THE DEPARTMENT

The educational missions of the College of Ophthalmology & Allied Vision Sciences is to educate and train optometrists, Orthoptists, Investigative Oculist to serve the needs of the health care populations, but also educate and train qualified teachers and researchers in the field of Vision Sciences; to provide post-doctoral education in advanced clinical areas (residencies); and to provide training for practitioners in new developments and the medical sciences. The research mission is to add to the body of knowledge identified as vision science and to its effective application. The service missions are to provide counsel and support to the profession in its quest to improve optometric services; to help provide appropriate health education to the public; to help extend care to those segments of society which are underserved; and to provide advice and counsel to the international Vision Sciences sector.

STATE NEED AND STUDENT DEMAND FOR THE PROGRAM

The need for the program was assessed from input of both; the field experts and industry and prospective/current candidates.

On a survey conducted by optometric Societies, group discussions and face to face interviews with prospective students and field experts, more than 80 % of them approved the idea of the program and emphasized the need with reference to the dire situation of Optometry in Pakistan. It is estimated that 15000 people needs one optometrist but currently we have one Optometrist for 70000 people. This program would fulfill the gap by supplying capable graduates into the community equipped with modern approaches and therapies specifically designed to empower the high performing national and international communities.

GOALS AND OBJECTIVES, STUDENT LEARNING OUTCOMES AND ASSESSMENT

Optometry and Orthoptics are relatively new but growing specialism of Ophthalmology. Optometry and Orthoptics are independent primary health care providers and represent the front line of vision health. The eye health and good vision of the public are the prime responsibilities of Pakistan’s Eyecare Health Professionals, who:

- Specialize in the examination, diagnosis, treatment, management and prevention of disease and disorders of the visual system, the eye and associated structures
- Diagnose ocular manifestations of systemic conditions such as diabetes and high blood pressure and complications of the aging process such as cataracts and macular degeneration
- Prescribe remedies to treat certain eye diseases

- Prescribe and fit eye glasses and contact lenses as well as safety eyewear and subnormal vision devises
- Provide vision therapy and low-vision rehabilitation
- Work in conjunction with other health care providers to provide integrated, quality care for patients
- Educate patients about vision health and lifestyle choices for protecting and enhancing good vision and health
- Conduct research and promote advancement in the visual sciences.

Optometry, Orthoptics and Investigative Oculist are regulated professions. They practice in a range of settings: most work in Government and private practice, others work in clinics, hospitals, community health centers, corporate optometry, research, teaching and administration.

QUALIFICATION EQUIVALENCE

All BSc (Hons.) in Vision Sciences programs will be equal to Education Level-6 of Higher Education Commission of Pakistan.

NOMENCLATURE OF QUALIFICATION

Bachelor of Science (Hons.) in Vision Sciences. (Optometry)
Bachelor of Science (Hons.) in Vision Sciences. (Orthoptics)
Bachelor of Science (Hons.) in Vision Sciences. (Investigative Oculist)

ACADEMIC CALENDAR

SR. #	DATES	EVENTS
01	1st October	Advertisement in media
02	15th November	First Merit list
03	25th November	2nd merit list
04	5th December	3rd merit list
05	20th December	Final date of fee submission
06	25th December	Final selection list
07	2nd January	Start of Classes
08	30th October	End of Classes
09	1st December	Professional Examination
10	2nd January	Start of Classes

LIST OF TEACHING FACULTY AT COAVS

DESIGNATION	NO.	QUALIFICATION	NAME OF OFFICERS
Professors	06	Dr. Asad Aslam Khan *(S.I)* (Ophthalmology)	MBBS, MS(Ophth), FRCS(Glas), FCPS(BD) ,PhD(Ophth)
		Dr. Raffea Tafweez (Anatomy)	M. Phil ,PhD
		Dr. Zujaja Zaheer (Pharmacology)	M. Phil
		Dr. Nakshab Choudhry (Bio-Chemistry)	MBBS, DCP, M.Phil., PhD
		Dr. Saqib Suhail (Physiology)	PhD
		Dr. Saeed Ahmad (Pathology)	MBBS, M. Phil
Associate Professors	04	Dr. Suhail Sarwar (Ophthalmology)	MS(Ophth)
		Dr. Humera Zafar	FCPS
		Abid Nadeem (Islamic Studies)	PhD
		M. Saleem choudhry (Pakistan Studies)	MA
Assistant Professors	04	Dr. Ashal Pal (Ophthalmology)	FRCS, FPO(Peads Oph Liverpool), MS(Peads Oph)
		Dr. Shabana Choudhary	FCPS, FRCS, MCPS
		Dr. Nida Usman (Ophthalmology)	FCPS, VR-Fellow
		Dr. Mohsin Rafiq (Physics)	Phd. Physics

Senior Registrar	07	Dr. Tehseen Mehmood	MS
		Dr. Farooq Ahmed	FCPS
		Dr. Rana Mohsin Javed	FCPS, MS(VR)
		Dr. Muhammad Abid	MS
		Dr. Muhammad Hassan Bukhari	MS
		Dr. Andleeb Zahra	FCPS
		Dr. Faisal Anwar	MS
Lecturer	01	Saad Khan (English)	MA English
Consultant Vitreo-Retina		Dr Irfan Karamat	FCPS, MS(VR)
Research Director		Dr. Imran Ahmed	MPH
Research Officer		Dr. Rashida Riaz	FCPS, MCEH
Community Ophthalmologist		Dr. Arif Hussain	MCEH
Medical Officers	11	Dr. Asif Khan	MBBS
		Dr. Moin Munir	MBBS
		Dr. Saman Ali	MS
		Dr. Tahir Ghaffar	MS
		Dr. Samreen Jamal	FCPS
		Dr. Sidra Latif	FCPS
		Dr. Nabila Khalid	MCEH
		Dr. Madiha Arif	MBBS
		Dr. Ruhma Ihsan	MBBS
		Dr. Asma Rafique	MBBS
		Dr. Mushkbar Mustafa	MBBS
Optometrist	03	Muhammad Anwar Awan	M. Phil
		Ayesha Saleem	M. Phil
		Beenish Latif	M. Phil

Orthoptist	03	Ayesha Sarfraz	B.Sc
		Tayyaba Burhan	B.Sc
		Syeda Rushda Zaidi	M. Phil
Investigative Oculist	03	Shahista Usman	B.Sc
		Zia ur Rehman	B.Sc
		Mudassir Fatima	B.Sc
Refractionist	04	Sidra Anwar	M. Phil
		Madiha Nazly	B.Sc
		Kiran Shehzadi	OD
		Hafiz Shehbaz	OD
Nursing Instructor	02	Tehseena Ikram	BSN Nursing
		Abida Asghar	BSN Nursing
Pharmascist	01	Asma Iqbal	Doctor of Pharmacy, MBA in Marketing
Sociologist		Noreen Fatima	Master in Sociology
Public Health Educationist	01	Sara Ikram	Masters in Zoology
IT Manager	01	Shahid Maqbool	M.Sc. Computer Sciences
Statician	01	Hafiza Ummara Rasheed	M.Phil.
Incharge Optical Lab	01	Hakim Anjum Nadeem	OD
Ocular Microbiologist		Sana Aslam	M.Phil

LIST OF ADMINISTRATIVE STAFF AT COAVS

DESIGNATION	NO.	NAME OF OFFICERS
Director General/ Principal	01	Dr. Asad Aslam Khan (S.I)
Director Academics	01	Dr. Suhail Sarwar
Director Research	01	Dr. Imran Ahmed
Director Admin	01	Dr. Nida Usman
Course Coordinator	02	Gohar Iqbal Saif Ullah
PS to Principal	01	Hammad Fareed
Computer Operators	03	Sajjad Awan Muhammad Zahid Naeem Saira Khan Niazi

JOB DESCRIPTIONS OF OPTOMETRIST, INVESTIGATIVE OCULIST, ORTHOPTIST AT COLLEGE OF OPHTHALMOLOGY & ALLIED VISION SCIENCES

1 As approved by the National Committee of Eye Health, Ministry of Health Government of Pakistan.
2 As approved by the Director General Health Services, Punjab vide notification No. 6130-6165/P.A on dated 17th September, 2015.

Ophthalmic Technician (LEVEL I)

- Minimum of one year time training in an accredited institution
- Should make an important team member with the Ophthalmologist,
- Note down the presenting complaints of patients,
- Ask the patient about common systemic diseases like diabetes, hyper-tension,
- Ask the patient about family history of common eye and systemic diseases (cataract, glaucoma, cornea, diabetes, and hyper-tension),
- Ask the patient about the use of any drug and allergy or hyper-tensile to any drug,
- Detection and referral of common causes of blindness and visual impairment,
- Prescribe Vitamin A CAPSULE/DROPS AND tetracycline, AS APPROPRIATE,
- Health education and counseling,
- Can use mydriatics and local an aesthetic with caution and responsibility as advised by Ophthalmologist,
- Can remove superficial conjunctiva foreign bodies,
- Can assesse visual acuity for near and far, use pinhole, measure IOP, and use of auto-refract meter,
- Assist the Ophthalmologist in the operation theatre and out-patient department,
- Basic care and maintained of ophthalmic equipment,
- Maintain the record of ophthalmic unit manually and computerized,
- Participate in community based eye health program like school eye health, trachoma control program, prevention of childhood blindness programme etc.

REFRACTIONIST (LEVEL II)

- Minimum of two years full time training in an accredited institution,
- Can perform all the functions of level I,
- Carry out of all patients whose visual acuity improves with pinhole,
- Assess the refractive state of a child 3 years and above using cycloplegic agent,
- Basic vision function assessment including assessment of visual fields, contrast sensitivity, and binocular visual function,
- Screening of ocular pathologies at outpatient department/ field and referral to appropriate specialist,
- Carry out basic funds examination using a direct ophthalmoscope,

- Performs any other relative assignment by the department,
- Maintain records of ophthalmic unit and reporting,
- Supervise school and community eye health screening programs,
- Coordinate and impart training to primary health workers and teachers,
- Contribute to health promotion activities,
- Contribute to eye health and blindness surveys,
- Carry out basic low vision assessment and prescribe LVDS from a defined range

OPTOMETRIST (LEVEL III)

Minimum of four years full time training leading to a university degree in an accredited institution

- **World Council of Optometry (WCO) defines optometrist as follows:**

  Optometrist are the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/ diagnosis and management of disease in the eye, and the rehabilitation of conditions of the system.

In light of the above, the following job description recommended for Pakistan.

- Can perform all the function of level II
- Can perform the additional skills acquired
  - Advanced refraction
  - Low vision assessment
  - Prescribe hard and soft contact lens
  - Carry out advance visual function assessment
  - Detection / diagnosis and referral of disease of eye

Can act as faculty member and trainer for level I and II and other relevant cadres;

- Engage in Operational and field research
- Manage record keeping, analysis and reporting
- Participate and lead on various eye campaigns

ORTHOPTIST (LEVEL III)

Minimum of four years full time training leading to a university degree in an accredited institution.

- Orthoptic assessment and non-surgical management
- Visual function assessment especially in children
- Paediartric refraction / assessment including cycloplegic refraction
- Engage in research related to BSV anomalies
- Teaching and training in the relevant field of expertise

- Performs any other relative assignment asked by the departments
- Record keeping and reporting

INVESTIGATIVE OCULIST (LEVEL III)

Minimum of four years full time training leading to a university degree in an accredited institution

- Assist ophthalmologist in LASER
- Perform the diagnostic procedures like FFA (in the presence of a doctor) A & B-Scan, Biometry, Perimetry, OCT, HRT, Electrophysiological test and other non-invasive advance diagnostic ophthalmic procedures.
- Maintenance of instrument & equipment
- Engage in Operational and field research
- Teaching and training in the relevant field
- Performs any other relative assignment by the department
- Record keeping and training

PART B

1. Admission criteria

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

I. Matriculation or equivalent securing a minimum of 60% marks.
II. F.Sc. (Premedical) or equivalent securing a minimum of 60 % marks.
III. Age less than 20 years at the time of submission of application.
IV. The candidate must have scored at least 60% marks in the latest MCAT exam.

b. Application Process: Applications for admission in BSc. (Hons.) Vision Sciences Program of College of Ophthalmology & Allied Vision Sciences, Mayo Hospital Lahore will be invited once a year, through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination along with admission criteria.

c. The merit shall be calculated as follows:
(%age of matric x 0.1) + (%age of FSc x 0.45) + (%age of MCAT/SAT x 0.45) = Total

2. Admission Process

a. All seats will be filled by open merit.

b. 32 seats will be allocated for Punjab, 08 seats (double) for Gilgitbiltistan , 8 seats (double) for Baluchistan, 4 seats for Sindh, 4 seats for KPK, and 4 seats for AJK.

c. 08 seats will be allocated for foreign students.

d. The candidate will be allocated a specific program in Vision Sciences according to the merit and available quota.

e. The candidates selected as per admission criteria, will be notified and offered admission in to BSc. (Hons.) Vision Sciences Program.

f. The acceptance of offer of admission by the candidate and joining report proforma signed by the Principal / Director General is to be submitted to the Course Coordinator after which admission will automatically stand invalid. The vacant seat will be filled in by the next available candidate on merit.

g. The Student will submit the fee (non-refundable) for the following components at the time of admission.

I. Registration Fee**.**
II. Hostel fee if university accommodation is availed
III. Utility Charges (Electricity, Gas and Water) if hostel accommodation is availed.

h. After a default of more than 30 days duration for the payment of any of the dues, the candidate will be expelled from the program except in special circumstances where it will be endorsed by the Principal.

i. In case of any grievances, appeal can be filed within 15 days before the Principal / Director General whose decision shall be final.

3. Program Seats

Program seats are available on following courses at College of Ophthalmology & Allied Vision Sciences (COAVS), Lahore at Mayo Hospital Lahore.

COURSE	BASIC REQUIREMENT	NO. OF SEATS
B.Sc. (Hons.) Vision Sciences a) Optometry b) Orthoptics c) Investigative Oculist 04 Years Program	○ Matriculation or equivalent securing a minimum of 60% marks ○ F.Sc (Pre-medical)or equivalent securing a minimum of 60% marks ○ Age: Less than 20 Years at the time of submission of application ○ The Candidate must have scored at least 60% marks in the latest MCAT Exam ○ The Merit Shell be Calculated as follows: (%age of Marks in Matric*0.1)+(%age of Marks in F.Sc *0.45)+(%age of Marks in MCAT/SAT*0.45)=Total	Punjab 32 Sindh 04 Baluchistan 08 Khyber Pakhtoonkhwa 04 Azad J & Kashmir 04 Gilgit Baltistan 08 Foreigners 08 **Total 68**

IMPORTANT NOTE:

- Foreign students should apply through Economics Affairs Division, Ministry of External Affairs, Government of Pakistan under Foreign Students Rules & Regulations.
- Foreign students will only be given acceptance letter and will be admitted only after clearance from Government of Pakistan as per laid down Protocol.
- Application Forms can be collected from College of Ophthalmology & Allied Vision Sciences. Form can also be downloaded from the website of the college (www.coavs.edu.pk)
- All admissions are on open merit.
- Last date for submission of application form is every year of 31st October.
- Interview dates for admission in MCEH program will be informed to the eligible candidates later on.
- Candidate applying against provincial quota seats will compete among themselves. Unfilled Seats from other Provinces & quotas will be given to open merit from Punjab.

PART C

1. The Program Scheme as per KEMU guidelines

a. B.Sc. (Hons.) Vision Sciences is an annual type Program. This will be a four year Program. Different courses will be covered in each year and will be assessed at the end of each year in an annual, professional exam.

b. Minimum period for this degree will be 04 years and maximum period will be 07 years.

Year	Credit Hours	Duration	Theory	Practical	Evaluation
Year 1	31-34	36 Weeks	80%	20%	1st Professional Exam
Year 2	31-34	36 Weeks	60%	40%	2nd Professional Exam
Year 3	31-34	36 Weeks	40%	60%	3rd Professional Exam
Year 4	31-34	36 Weeks	40%	60%	4th Professional Exam

2. Credit hours scheme

a. This will be 130 credit hours Program, extending over the period of 4 years.

b. Credit hours system will be followed as devised by the Higher Education Commission of Pakistan for BSc (Hons.) Program.

c. A credit hour means teaching a theory course for one hour each week throughout the year.

d. One credit hour in the laboratory or practical work/project would require lab contact of three hours per week throughout the semester.

e. The credit hours are denoted by two digits within brackets with a hyphen in between. The first digit represents the theory part while the second (right side) digit represents the practical.

f. Thus 3(3-0) means three credit hours of theory, while 4(3- 1) means a total of four credit hours, of which three are of theory while one credit hour is for laboratory or practical work.

3. Courses of the curriculum

a. The whole curriculum will be managed through different 'Courses', over a period of four years. Curriculum will be developed, managed and maintained by 'Program Faculty Committee'.

b. Course assessment will be carried out at the end of each Course. Course evaluation will be prepared by Course Incharge declared by the 'Program Faculty Committee', acting as Head Examiner.

c. Program faculty committee will ensure that course in charge teaching the course should be assessing the students as well.

d. Candidate (s) must achieve at least 50% marks to pass the course.

e. No makeup/reset exam will be conducted for the candidate (s) who fails to achieve 50% marks in any course.

f. The report of the attendance and result of each Course evaluation will be prepared by the Course in charge and send to the Principal / Director General for courses who shall forward a copy to the Controller of Examination.

d. Completion of theoretical course with in Ten (10) months is mandatory.

PART D

FRAMEWORK FOR BSC (HONS.) VISION SCIENCES (4 YEAR PROGRAM)

- Total numbers of Credit hours 130 (HEC recommended: 124-136)
- Duration 04 years
- Specialization of Course 03

Scheme of studies for B.Sc. (Hons.) Vision Sciences Program

YEAR	MODULES	CREDIT HOURS	CODE
1ST PROFESSIONAL YEAR	Introduction to Anatomy	(3-1) 4	AHS-101
	Introduction to Physiology	(3-1) 4	AHS-102
	Introduction to Pharmacology	(2-1) 3	AHS-103
	Introduction to Pathology	(3-1) 4	AHS-104
	Introduction to Biochemistry	(2-0) 2	AHS-105
	Biostatistics & epidemiology	(2-0) 2	AHS-106
	Basic Computer and Information Sciences	(0-2) 2	AHS-107
	Physics	(2-0) 2	AHS-108
	Pakistan Study	(3-0) 3	AHS-109
	Islamic study	(3-0) 3	AHS-110
	English	(2-0)2	AHS-112
	TOTAL	**(25-6) 31**	
2ND PROFESSIONAL YEAR	Ocular Anatomy	(2-0.5) 2.5	M 2001
	Ocular Physiology	(2-0.5) 2.5	M 2002
	Ocular Pharmacology	(1-1)2	M 2003
	Ocular Pathology	(2-1)3	M 2004
	Epidemiology	(1-0)1	M 2005
	Communication skills	(0-1)1	M 2006
	Basic Clinical Functions & Skills	(1-1)2	M 2007
	Ophthalmic nursing	(0.5-0.5)1	M 2008
	Basic optics & Refraction	(1.5-1.5)3	M 2014
	Geometrical optics	(1-1)2	M 2015
	Physical optics	(1.5-1.5)3	M 2016
	Advanced visual optics	(1.5-1)2.5	M 2017
	Advanced visual functions	(2-0)2	M 2018
	Inclusive Eye Health Basic	(1.5-0)1.5	M 2019
	Practical training in OPD	(0-3)3	M 2020
	TOTAL	**(18.5-13.5) 32**	

3TH PROFESSIONAL YEAR	Primary Health Care & Primary Eye-care Overview of blindness and National Program for Prevention & Control of Blindness in Pakistan	(1.5-0) 1.5	M 3001
	Inclusive Eye Health Intermediate	(1-0.5) 1.5	M 3002
	Advanced refraction & Retinoscopy	(2-1.5) 3.5	M 3003
	Avoidable & unavoidable causes of blindness	(1-0) 1	M 3004
	Practical Retinoscopy	(0-3) 3	M 3005
	Basic dispensing optics	(2-1) 3	M 3006
	Ophthalmic instruments & their maintenance	(2.5-0.5) 3	M 3007
	Contact lenses	(2-1) 3	M 3008
	Low vision	(2-1) 3	M 3009
	Ocular motility & Binocular single vision	(1-0.5) 1.5	M 3010
	Orthoptic techniques	(1-0.5) 1.5	M 3011
	Patient dealing ethics	(1.5-0.5) 2	M 3012
	Application of advanced visual functions	(1-0.5) 1.5	M 3013
	Advanced diseases of eye & their management	(2.5-1.5) 4	M 3014
	TOTAL	**(21-12) 33**	
4TH PROFESSIONAL YEAR	**OPTOMETRY**		
	Review of basics of vision and optics	(1.5-2.5) 4	M 4101
	Visual Sciences 1,2,3,4	(2.5-2.5) 5	M 4102
	Binocular vision & its Clinical Application	(2-2) 4	M 4103
	Clinical Optometry	(1-3) 4	M 4104
	Dispensing optics	(2-3) 5	M 4105
	Contact lenses	(2.5-2.5) 5	M 4106
	Applied statistics, Research Methodology & Project	(1-4) 5	M 4107
	Inclusive Eye health Advanced	(1.5-0.5) 2	M 4109
	TOTAL	**(14-20) 34**	
	ORTHOPTICS		
	Review of basics of vision and optics	(1-3) 4	M 4201
	Visual Sciences 1,2,3,4	(2-3) 5	M 4202
	Clinical Orthoptics	(3-2) 5	M 4203
	Binocular vision & its Clinical Application	(3-2) 5	M 4204
	Management of Disorders & Dispensing Optics	(2-2) 4	M 4205
	Neuro-Orthoptics / Neuro-ophthalmology	(3-2) 5	M 4206
	Applied statistics, Research Methodology & Project	(1-4) 5	M 4207
	Inclusive Eye Health Advanced	(1-0) 1	M 4209
	TOTAL	**(16-18) 34**	

	INVESTIGATIVE OCULIST		
	Review of Anatomy of Eye and Orbit	(2-0) 2	M 4301
	Review of biomedical engineering & Optics	(2-1) 3	M 4302
	Ophthalmic photography & fluorescein angiography	(2-1) 3	M 4303
	OCT and HRT	(1-1) 2	M 4304
	B. Scan	(1-1) 2	M 4305
	Perimetery	(2-1) 3	M 4306
	Biometry	(2-1) 3	M 4307
	ERG, VEP, EOG and Ophthalmic LASER	(1-0) 1	M 4308
	Eye Banking	(1-1) 2	M 4309
	Applied Statistics, Research Methodology & Project	(1-4) 5	M 4310
	Advanced Inclusive Eye Health	(1-0) 1	M 4311
	Practical training in OPD	(0-7) 7	M 4312
	TOTAL	**(16-18) 34**	

COURSE CONTENTS OF FIRST PROFESSIONAL YEAR

COURSE CODE: AHS-101 **INTRODUCTION TO ANATOMY** CREDIT HOURS: (3-1) 4

Objectives

This course will enable students to

- Use anatomical terminology to identify and describe locations of major organs of each system covered
- Explain interrelationships among cellular, tissue and organ contribution in making of each system
- Describe the interdependency and interactions of the systems.

Course content

1. **General anatomy topics**
    - Classification of bones
    - Cartilage and its types
    - Classification of muscles
    - Arterial system
    - Venous system
    - Lymphatic system
    - Introduction to the nervous system
    - Receptors
    - Autonomic the nervous system
    - Models and specimens of nervous system
2. **Histology topics**

Overview of histology of

- Epithelium
- Connective tissue
- Cartilage
- Muscles
- Arterial and venous system
- Spinal cord
- Cerebrum
- Cerebellum

3. **General disposition of visceras**
    - Thorax
    - Gastrointestinal system
    - Reproductive system
    - Renal system

PRACTICALS

- Demonstration of structures on
    - Models
    - Specimens
    - Spottings
    - Histology Slides
    - X-Rays

COURSE CODE: AHS-102 **INTRODUCTION TO PHYSIOLOGY** CREDIT HOURS: (3-1) 4

Objectives

This course will enable students to

- Define homeostasis and explain how homeostatic mechanisms normally maintain a constant interior milieu
- State the functions of each organ system of the body, explain the mechanisms by which each functions relate the functions and the anatomy and histology of each organ system
- Understand and demonstrate the interrelations of the organ systems to each other
- Predict and explain the integrated responses of the organ systems of the body to physiological and pathological stresses
- Explain the pathophysiology of common diseases related to the organ systems of body

Course content

1. **Cell Physiology**
    - General functional organization of human body
    - Cell-organelles and their functions
    - Mechanisms of transport across cell membrane
    - Body fluid compartments.
2. **Homeostasis**
    - Definition, maintenance, control of internal environment,
    - Different regulatory systems in homeostasis
    - Concept of negative and positive feedback mechanisms
3. **Nerve & Muscle Physiology**
    - Molecular basis of resting membrane and action potential
    - Functional anatomy of skeletal, smooth & Cardiac muscles
    - Structure and transmission across neuromuscular junction.
    - Excitation-contraction coupling
    - Mechanisms of muscle contraction.
4. **Blood Physiology**
    - Blood as a body fluid: Composition and functions of blood
    - Plasma: Normal constituents
    - Plasma Proteins: Types, concentrations, properties and functions
    - Characteristics & Functions of RBC, WBC & Platelets
    - Anaemia & Leucopenia
    - Blood groups: Agglutinogens and agglutinins, Landsteiner's law, ABO and Rh group, minor blood groups
    - Hemostasis: Physiology of coagulation
    - Immunity and its types

5. **Respiratory Physiology**
    - Physiology of Upper& Lower Respiratory System
    - Lungs & Volume capacities
    - Transport of gases across the Respiratory membrane
    - Nervous & Chemical Control of Respiration
    - High Altitude & Deep-Sea diving Physiology
6. **Cardiovascular Physiology**
    - Heart as a mechanical pump: Design of systemic and pulmonary circulation
    - Properties of myocardial cells: Site of generation of cardiac impulse –pacemaker tissue, Mechanisms of spontaneous generation of impulses
    - Brief Physiology of ECG, Cardiac Cycle & Cardiac output
7. **GIT Physiology**
    - Structure & Function of GIT
    - Formation, properties & control of Saliva
    - Bile & Pancreatic Juice
    - Motility of GIT & its control
    - Brief Physiology of Vomiting, Diarrhea, Constipation & Defecation
8. **Renal Physiology**
    - Structure& Function of Nephron
    - Process of Urine Formation
    - Micturition Reflex
    - Water& Electrolyte Imbalances
9. **Endocrine System Physiology**
    - Hormones, Classification, Receptors & Mechanism of action of Hormones
    - Hormones of Hypothalamus, Pituitary, Thyroid, Parathyroid & Adrenal glands
10. **Reproductive Physiology**
    - Male& Female Reproductive Systems
    - Female reproductive cycles
    - Physiology of Pregnancy & Lactation
11. **Nervous System Physiology**
    - Organization of Central & Peripheral Nervous System
    - Composition, Formation & Circulation of CSF
12. **Special Senses Physiology**
    - Physiology of Vision
    - Physiology of Audition
    - Physiology of Olfaction
    - Physiology of gestation

COURSE CODE: AHS-103 **INTRODUCTION TO PHARMACOLOGY** CREDIT HOURS: (2-1) 3

Objectives

At the end of the course the students will be able to

- Identify a range of drugs used in medicine and discuss their mechanisms of action
- Report the clinical applications, side effects and toxicities of drugs used in medicine
- Explain how the fundamental pharmacological properties of pharmacokinetics and pharmacodynamics influence routes of administration; drug distribution and drug levels in the body; drug efficacy and potency; potential for drug-drug interactions; drug toxicity; and the appropriate choice of drug for pharmacotherapy in a given patient
- List the major drugs and drug classes currently used in medical practice and describe their pharmacology including their indications, contraindications, clinical use, and mechanisms of action, physiological effects, pharmacokinetic properties, major adverse effects and clinically significant drug interactions.

Course content

1. **General Pharmacology**
    - Introduction & Branches of Pharmacology
    - Sources & Active principle of drugs
    - Dosage form
    - Routes of Administration of drugs
    - Transport of drugs Across the Cell Membrane
    - Pharmacokinetics
    - Factor Affecting Absorption of drugs
    - Pharmacodynamics
    - Agonist, Antagonist, Antagonism, Plasma Half-Life
    - Drug Interactions
    - Adverse Drugs Effects
    - Tolerance, Tachyphylaxis
2. **Autonomic Nervous System (ANS)**
    - Introduction to Sympathetic & Parasympathetic Nervous System
    - Neuro Transmission & Receptors
    - Para-sympathomimetics Drugs
    - Para-sympatholytic Drugs
    - Sympathomimetic Drugs (Adrenoceptor Agonists)
    - Sympathoplegic Drugs (Adrenoceptor Antagoinsts)
    - Skeletal Muscle Relaxants

3. **Central Nervous System (CNS)**
    - Introduction & Neurotransmitters
    - General Anesthetics
    - Local Anesthetics
    - Sedative & Hypnotics
    - Opoids, Non-Steriodal Anti-Inflammatory Drugs (NSAIDs)
    - Anti- Epileptic Drugs
4. **Cardio Vascular System (CVS)**
    - Anti- Hypertensive Drugs
    - Anti-Anginal Drugs
5. **Respiratory System, GIT & Diuretics**
    - Bronchodilators
    - Treatment of Bronchial Asthma
    - Drug Treatment for Acid Peptic Disease (APD)
    - Anti-Emetics
    - Anti-Diarrheal
    - Loop-Diuretics
    - Thiazide Diuretics
    - Potassium Sparing Diuretics
6. **Chemotherapy**
    - Introduction to chemotherapy & Principles of Anti-Bacterial Therapy
    - Pencillins
    - Cephalosporins
    - Quinolones
    - Chloramphenicol & Tetracyclines
    - Aminoglycosides
    - Sulphonamides & Trimethoprim
    - Macrolides
    - Anti-Tuberculous Drugs (TB)
    - Anti-Amoebic Drugs
    - Anti-Malarial Drugs
7. **Endocrinology**
    - Cortico-Steroids
    - Insulin & Oral Hypoglycemic Drugs

RECOMMENDED BOOKS

Lippincot, Mini Catzung

COURSE CODE: AHS-104 **INTRODUCTION TO PATHOLOGY** CREDIT HOURS: (3-1) 4

Objectives

This course will enable students to

- Understand the pathologic basis of diseases
- Understand the principles considered in test selection for screening, diagnosis treatment and monitoring of disease
- Explain the basic nature of disease processes from the standpoint of causation, epidemiology, natural history, and the structural and functional abnormalities
- Devise likely diagnoses from clinical scenarios by recognizing key manifestations of congenital, hemodynamic, inflammatory, infectious, metabolic, environmental, and neoplastic diseases
- Apply knowledge of pathology's role in diagnosis, staging, and management of disease
- Outline a classification of causes of disease, basic responses of the body to injury, and manifestations of disease

Course content

1. **Introduction of Pathology:**
   - Branches of pathology and their role in diagnosis
   - Genomic organization of a cell
   - Cellular housekeeping cell cycle
2. **Immunity**
   - Definition
   - Types of immunity with example
   - Innate and humoral immunity
   - Hypersensitivity types and pathogenesis
   - Autoimmune diseases
3. **Cell Injury**
   - Adaption of cellular growth and differentiation
   - Morphological alteration in cell injury
   - Necrosis, patterns of necrosis
   - Apoptosis
   - Pathological calcifications
4. **Acute Inflammation**
   - Definition
   - Morphologic pattern of acute inflammation and outcome
5. **Chronic Inflammation:**
   - Morphological features

- Granulomatous inflammation and outcomes

6. **Hemodynamics**
   - Hyperemia and congestion
   - Pathophysiology and classification of edema
   - Hemorrhage
   - Thrombosis
   - Embolism
   - Infraction
   - Shock
7. **Neoplasia**
   - Nomenclature
   - Characteristics of benign and malignant tumors
   - Local invasion differentiation example, metaplasia and anaplasia etc.
8. **Healing & Repair**
   - Features that influence tissue repair and fibrosis
   - Abnormalities in tissue repair
9. **Basic Procedure in Haematology:**
   - Erythrocyte sedimentation rate (objectives, types) factors affecting, procedures, interpretation and significance)
   - Preparation of blood smear, staining of smear, red cell morphology, reticulocyte count
   - White Blood cell count and differential condition associate with increased and decreased white cells
   - Laboratory test tubes and anticoagulants, types of blood collection (venous, capillary and preparation)
   - Packed cell volume determination and causes of increased and decreased hematocrit and sources of errors
   - Direct and indirect coombs test and significance
   - Bleeding time with significance
10. **Blood Banking:**
    - Blood cell antigens, laboratory determination of major blood groups and significances
    - Blood components and derivatives preparation and significance
    - Transfusion reactions (acute and chronic)
11. **Leukemia**
    - Acute leukemia (AML & ALL)
    - Chronic leukemia (CML & CLL)

12. Coagulation Disorder or Haemostasis

- Coagulation pathways and coagulation test (common coagulation), conditions associated with prolong coagulation test
- Disseminated Coagulopathy
- Qualitative and quantitative platelets disorders

13. Basic Procedure in Microbiology

- Microscopy, Gram Staining
- ZN Staining
- Culture and sensitivity
- Basic Culture Media
- Serological test
- Hepatitis B, HCV and HIV
- TB Screening
- Direct specimen examination and Culture
- Principal of Hot Air Oven & Autoclave
- Routine Examination of Urine & Stool

14. Basic Procedure in Chemical Pathology/Chemistry

- Phases of laboratory testing; Pre-analytical, Analytical, Post Analytical
- Specimen collection and processing
- Different Vacationers; their additives and use in Chemical Pathology
- Common tests affected by additive contamination
- Order of sample draw
- Pre analytical variables affecting results
- Diabetes mellitus and diagnostic criteria
- Lipid profile and hyperlipidemia
- Metabolic syndrome
- Risk factors and biomarkers of Ischemic heart disease
- Liver function tests and jaundice
- Renal function tests and renal failure
- Acid base disorders
- Common tumor markers
- Laboratory diagnosis of pancreatitis
- Vitamin D and its deficiency disorders

RECOMMENDED BOOKS

Robins' and Catran Basic Pathology (Mini)

COURSE CODE: AHS-105 **INTRODUCTION TO BIOCHEMISTRY** CREDIT HOURS: (2-0) 2

Objectives

This course will enable students to

- Explain/describe the structure and synthesis of proteins, lipids, nucleic acids, carbohydrates, vitamins and minerals
- Describe their role in metabolic pathways along with their regulation

Course content

1. Protein Chemistry
2. Protein Metabolism
3. Heme Protein
4. Carbohydrate Chemistry
5. Carbohydrate Metabolism
6. Integration of Metabolism
7. Biological Oxidation
8. Lipid Chemistry
9. Lipid Metabolism
10. Nucleotide Chemistry
11. Molecular Biology
12. Vitamins Minerals & Nutrition
13. Enzymes
14. Endocrinology
15. Digestion - GIT

COURSE CODE: AHS-106 **BIOSTATISTICS AND EPIDEMIOLOGY** CREDIT HOURS: (2-0) 2

Objectives

This course will enable students to

- Effectively collect data, describe data, and use data to make inferences and conclusions about real world phenomena
- Demonstrate a solid understanding of interval estimation and hypothesis testing
- Choose and apply appropriate statistical methods for analyzing one or two variables.
- Use technology to perform descriptive and inferential data analysis for one or two variables.
- Interpret statistical results correctly, effectively, and in context
- Understand different types of study design and their merits and demerits

Course content of Biostatistics

1. **Introduction**
   - Meaning of Statistics
   - What is Bio-Statistics
   - Importance of Bio-Statistics/Statistics
   - Types of Statistics
   - What is Data
   - Types of Data
   - Sources of Data
   - Uses of Data
   - Concepts about constant and variable
   - Types of variables
   - Definition of population and Sample with examples

2. **Presentation of Data**
   - Introduction
   - Frequency Distribution
   - Types of graphs
   - Pie Charts
   - Histogram
   - Bar charts
   - Scattered Plots
   - Frequency Polygon
   - Uses of charts

3. **Measures of Central tendency**
    - What is the measure of central tendency
    - Types of averages
    - Arithmetic Mean
    - Median
    - Mode
    - Geometric mean
    - Harmonic Mean
    - Quartiles, Percentiles

4. **Measures of Dispersion**
    - Introduction
    - Types of measures of dispersion
    - Range
    - Mean Deviation
    - Standard Deviation
    - Variance
    - Coefficient of Variation
    - Skewness

5. **Measurement Levels**
    - Introduction
    - Measurement and Measurement Scales
    - Types of Measurement Scales
    - Why Is Level of Measurement Important?
    - Hierarchy of Levels

6. **Probability**
    - Introduction
    - Definitions of probability
    - Classical probability
    - Empirical probability
    - Probability calculations

7. **Correlation**
    - What is correlation
    - Assumptions of correlation
    - Difference between negative and positive correlation
    - Plots for correlation
    - Pearson's correlation
    - Spearman's rank correlation
    - Numerical problems for correlation
    - Uses and importance of correlation

8. **Regression**
    - Introduction
    - Types of regression
    - Assumptions
    - Prediction
    - Uses of regression
    - Importance

9. **Statistical Inference**
    - Estimation
    - Point estimation
    - Interval estimation
    - Testing of hypothesis
    - P-value

10. **Parametric Tests**
    - T-test
    - Assumptions of t-test
    - One sample t-test
    - Independent sample t-test
    - Paired sample t-test
    - Numerical problems of all types of t-test
    - Z- test
    - Assumptions of Z-test
    - Types of Z-test
    - Examples

11. Analysis of Variance

- Introduction
- Assumptions
- ANOVA test hypothesis
- F-statistics
- ANOVA table
- Examples
- One way and two-way ANOVA

12. Chi-Square Distribution

- Introduction
- 2x2 contingency table
- Exact test for 2x2 tables
- Uses of chi-square distribution

13. Non-parametric methods

- Introduction
- Why and when we use non-parametric tests
- Wilcoxon Signed rank test
- Wilcoxon rank sum-test
- Kruskal wallis H-test

COURSE CONTENT OF EPIDEMIOLOGY

1. The natural history of disease

- Concept of Health, Disease & Disability
- Stages of disease process (Introduction of an agent, Asymptomatic stage, Symptomatic stage, Stage of disability/recovery/death)
- Prevention types and levels

2. Introduction to the Principles of basic epidemiology

- Definition of Epidemiology
- Distribution of diseases
- Determinants of diseases (Fundamental assumption, disease causation)
- Frequency of Disease

3. **Descriptive epidemiology**
    - Case report
    - Case series
    - Cross-sectional surveys

4. **Analytical epidemiology**
    - Comparative cross-sectional studies
    - Case-control studies
    - Cohort studies

5. **Experimental epidemiology**
    - Trials (Randomized controlled trials, quasi experimental studies)

    Screening

6. **Epidemiology of ocular disease**
    - Distribution of eye health problem / disease
    - Determinants of eye health problem/ disease
    - Risk factors of eye health problem/ disease

COURSE CODE: AHS-107 **BASIC COMPUTER AND INFORMATION SCIENCES** CREDIT HOURS: (0-2) 2

Objectives

This course will enable students to

- Effectively use computer in daily professional work
- Familiarize with information technology

COURSE CONTENT

1. **Introduction**
    - Definition of Computer, Parts of Computer
    - Data Measurement Units
    - Hardware, Software
    - Types of Software, Application Software, System Software

2. **Use of Office Applications**
    - Use of Office Applications in Office Environment
    - Introduction to Microsoft Word as Word Processor
    - Introduction to Microsoft Excel as Statement Processor
    - Introduction to Microsoft PowerPoint as Presentation Processor
    - Introduction to INTERNET and its importance in Official Environment
    - Working with Documents using Microsoft Word
    - Creating New Document Files Manually
    - Creating New Document Files using Wizard
    - Managing Files
    - Working with Text (Undo, Redo, Spelling, Grammar, Font and Size etc.)
    - Working with Paragraph (Alignment, Spacing, Bullet & Numbering etc.)
    - Working with Tables (Create, Revision, Formatting Tables)
    - Working with Documents (Locate, Open, Save as Web Page, Printing etc.)
    - Working with Pictures and Charts (Inserting Word Art, Clip Art, Images etc.)
    - Working with Mail merge (Single Letter to Multiple Using Address Data)
    - Working with Statements Using Microsoft Excel
    - Creating New Sheet Manually
    - Creating New Sheet using Wizard
    - Working with Presentations using Microsoft PowerPoint
    - Creating New Presentation Manually
    - Creating New Presentation using AutoContent Wizard

3. **Working with Visual Elements (ClipArt, Adding Table, Rotate & Fill etc.)**
    - Customizing Presentation (Speaker Notes, Slide Transition, and Animate
    - Object Etc.)
    - Creating Output (B&W View, Color View, Printing in Different Formats etc.)
    - Delivering Presentation (Starting, On Screen Navigation, Publishing etc.)

4. **Introduction to Information Technology**
    - The Internet and the World Wide Web
    - Introduction to the means of connecting to the Internet
    - What is an Internet Service Provider
    - What are the options for obtaining an e-mail software
    - What are the components of an e-mail address
    - What are websites, web pages, browsers, URLs and search engines
    - Protocols of Internet (http, https, ftp)
    - How to explore Internet
    - Finding Specific Information

COURSE CODE: AHS-108 **PHYSICS** CREDIT HOURS: (2-0) 2

Objectives

This course will enable students to

- Understand basic principles of medical Physics
- Understand different principles used in disease diagnosis and treatment

COURSE CONTENTS OF PHYSICS

1. **Introduction to Physics**
    - Physics and its branches
    - Medical Physics
    - Human Body Physics
    - Role of Physics in diagnosing and treatment of deceases

2. **Mechanics**
    - Newton's laws
    - Applications of these laws in medical fields
    - Concept of friction in fluids in rest and in dynamic states

3. **Fluid Dynamics**
    - Viscous drag and Stokes Law
    - Fluid Flow
    - Pascal's Law and its applications in medical field.
    - Concept of Pressure in fluid specifically in blood.
    - Surface tension
    - Viscosity

4. **Waves and Oscillations**
    - Waves and their types
    - Sound waves
    - Resonance and its use in medical diagnostic techniques
    - Sound waves and their use in Ultrasound
    - Effect of pressure, density, and temperature on sound waves
    - Concept of ultrasonic
    - Doppler's effect and its applications related to medical equipment

5. **Atomic and Nuclear Physics**
    - Atomic spectra and its type
    - Wave-matter duality
    - X-rays, its production and types, Uses related to medical fields
    - Radioactivity, half-life, isotopes and their uses in medical applications
    - Interaction of radiation with matter
    - Radiation detectors and their uses in diagnostic tools like in Ultrasound technique.
    - Radiation exposures

6. **Diagnostic Techniques**
    - Principle, Construction, working, and uses of following techniques in medical fields with advantages and disadvantages
        - Computed Tomography (CT) Scan
        - LASERS
        - Optical fiber
        - Ultrasound
        - Magnetic Resonance Imaging (MRI)
        - Positron Emission Tomography (PET)

RECOMMENDED BOOKS

Principles of Physics by Holliday Resnick

COURSE CODE: AHS-109 **PAKISTAN STUDY** CREDIT HOURS: (3-0) 3

Objectives

This course will

- Provide information about the need of Pakistan creation and the struggle for homeland
- Broaden students vision and understanding of society, democratic citizenship, cultural diversity, and religious harmony
- create awareness about Pakistan as an enlightened nation by comparing it with the rationale and endeavours for Pakistan's creation

COURSE CONTENT

1. The ideology of Pakistan
2. Ideology of Pakistan Historical Perspective
3. Pakistan Movement the First Phase
4. Pakistan Movement the second Phase
5. Birth of Pakistan and Initial Problems
6. Endeavors to English an Islamic State
7. Pakistan – The Land and the People
8. Pakistan and the Muslim World

RECOMMENDED BOOKS

A Text Book of Pakistan Studies for B.Sc. (Hons.) by Sheikh Muhammad Rafique

COURSE CODE: AHS-110 **ISLAMIC STUDIES** CREDIT HOURS: (3-0) 3

Course Objective

This course is aimed at:

- To provide Basic information about Islamic Studies
- o enhance understanding of the students regarding Islamic Civilization
- To improve Students skill to perform prayers and other worships
- To enhance the skill of the students for understanding of issues related to faith and religious life.

قرآن مجید

مطالعہ قرآن مجید کی ضرورت واہمیت

قرآن کریم سے متعلق موضوعات کے بارے میں آیت دی جائے گی اور آیت کی تشریح طلب کی جائے گی۔

(الف) ایمانیات (دلائل کا عقلی ونقلی مطالعہ)

توحید، رسالت، ملائکہ، کتب آخرت کے اثبات پر دلائل، ختم نبوت، ناموس رسالت

(ب) عبادات

نماز، روزہ، حج، زکوۃ، جہاد

(ج) تفکر وتدبر، اسلام کا تصور علم اور تصور اجتہاد

(د) خدمت خلق

(ہ) مومن کی صفات

(و) دعوت دین کی ضرورت واہمیت نوعیت، امر بالمعروف ونہی عن المنکر

(ز) کسب حلال

قرآن مجید کی مندرجہ ذیل آیات

(i) البقرۃ (۲ آیات نمبر 284 تا ۲۸۶) لله مافی السموت ما فی الرض ... علی القوم الکفرین

(ii) الحجرات (۴۹: آیات 1 تا 18 موضوع آداب نبوی، معاشرتی احکام)

(iii) المومنون (23: آیات 1 تا 11 صفات مومنین)

(iv) الفرقان (25: آیات 63 تا 77 موضوع آداب معاشرت)

(v) الانعام (6 آیات 152 تا 154) حکام

(vi) الاحزاب (33: آیات 6-21-40-56-57-58) تخصصات نبوی

(vii) الحشر (59: آیات 18-19-20) فکر آخرت، عظمت قرآن

(viii) الصّف (61:1-14) تفکر وتدبر سے متعلق آیات، بشارت بعثت ختم المرسلین، دعوت اور اقامت دین

(ix) حم السجدہ (41` آیات نمبر: 53) سنریهم ایتنافی الافاق و فی انفسهم حتی یتبین لهم انه الحق

آل عمران (3: آیات نمبر 190-191) (ان فی خلق السموت والارض واختلاف الیل و النهار الایت الاولی الالباب الذین یذکرون الله)

النحل (16: آیت 14-12) و سخر لکم اللیل والنهار

لقمن (31 آیت نمبر 20) الم ترو ان الله سخر لكم ما فی السموات وما فی الارض واسبغ علیم نعمه....)

سیرت النبی ﷺ

مندرجہ ذیل موضوعات

(i) مطالعہ سیرت النبی ﷺ کی ضرورت واہمیت

(ii) تزکیہ نفس اور تعمیر سیرت وشخصیت کا نبوی منہاج

(iii) اجتماعیت وتشکیل معاشرت اور اسوہ حسنہ، اخوت واتحاد وامت

(iv) قرآن مجید میں سیرت سرور عالم ﷺ کا بیان

(v) غزوات نبوی، مقاصد وحکمت

تہذیب واخلاق

تہذیب کا مفہوم، اسلامی تہذیب کی خصوصیات

حسن معاشرت، حقوق العباد، حقوق نسواں، تربیت اولاد، حلال وحرام، غیر مسلموں سے تعلقات، عدل، احسان، ایدائے ذی القربی

بنیادی انسانی حقوق، حجۃ الوداع، ماحولیات، قرآن حکیم کا یہود ونصاری، مشرکین اور منافقین سے مکالمہ

تہذیب انسانی کے ارتقاء میں مسلمانوں کا کردار

مندرجہ ذیل عنوانات

طبیعی علوم، حیاتیاتی علوم، معاشرتی علوم، انتظامیات (ایڈمنسٹریٹو سائنسز) ماحولیات، زراعت

متن حدیث

۱۔ عن عبداللہؓ قال: قال رسول الله ﷺ طلب كسب الحلال فريضه بعد الفريضه (بيهقى شعب الايمان)

۲. عن ابی سعیدؓ عن النبی ﷺ قال التاجر الصدوق الامين مع النبيين والصديقين والشهداء

۳. عن ابن مسعود عن النبی ﷺ قال لا تزول قدما ابن ادم يوم القيامة من عند ربه حتى يسال عن خمس: عن عمره فيما أفناه و عن شبابه فيما أبلاه وعن ماله من اين اكتسبه و فيما أنفقه وماذا عمل فيما علم(رواه الترمذی)

۴. عن ابی هريرةؓ قال: كان رسول الله ﷺ يقول اللهم انی اعوذبک من الاربع من علم لا ينفع ومن

قلب لا يخشع ومن نفس لا تشبع ومن دعاء لا يسمع.

٥ عن علیؓ قال: قال رسول الله ﷺ من ملک زادا و راحلة تبلعه الی بیت الله ولم یحج فلا علیه ان یموت یهودیا او نصر انیا و ذالک ان الله تبارک و تعالی یقول ولله علی الناس حج البیت من استطاع الیه سبیلا

٦ عن ابن عباس رضی الله عنهما ان النبی ﷺ قال اربع من أعطیهن فقد أعطی خیر الدنیا والاخرة قلب شاکرا ولسانا ذاکرا وبدنا علی البلاء صابرا و زوجة لا تبغیه حوبا فی نفسها وماله

٧ عن ابی هریرةؓ ان رسول الله ﷺ قال اتدرون ما المفلس قالو االمفلس فینا من لادرهم له ولا متاع فقال ان المفلس من امتی من یاتی یوم القیامه بصلاة و صیام و زکوة ویاتی قد شتم هذا و قذف هذا واکل مال هذا و سفک دم هزا و ضرب هذا فیعطی هذا من حسناته و هذا من حسناته فان فنیت حسناته قبل ان یقضی ما علیه اخذ من خطایاهم فطر هت علیه ثم طرح فی النار (رواه مسلم)

٨ عن ابی هریرةؓ قال: قال رسول الله ﷺ من اتاه الله مالا فلم یؤدزکاته مثل ماله یوم القیامة شجاعا اقرع له زبیبتان یطوقه یوم القیامة ثم یاخذ بلهز متیه (یعنی شدقیه) ثم یقول انا مالک وانا کنزک ثم تلا: ولا تحسبن الذین یبخلون بما اتهم الله من فضله هو خیرالهم بل هو شر لهم ط سیطوقون مابخلو به یوم القیمة (صحیح بخاری)

٩ عن شبرمة بن معبدؓ قال: قال رسول ﷺمروا الصبی الصلوة اذا بلغ سبع سنین و اذا بلغ عشر سنین فاضربوه علیها. (اکرجه ابودود الترمذی) ولفظه علمو اصبی الصلوة ابن سبع سنین واضربوه علیها ابن عشر.

١٠ عن ابی هریرةؓ قال: قال رسول الله ﷺ تجدون شرالناس یوم القیامة ذاالوجهین الذی یاتی هؤلاء بوجه و هؤلاء بوجه. (متفق علیه)

١١ قال رسول الله ﷺ یجاع بالرجل یوم القیامة فیلقی فی النار فتندلق اقتابه فی النار فیطحن فیها کطحن الحمار برحاة فیجتمع اهل النار علیه فیقولون ای فلان ماشانک الیس کنت تامرنا بالمعروف و تنهانا عن المنکر قال کنت امر کم ولا اتیه و انها کم عن المنکر واتیه

١٢ عن ابی هریرةؓ قال: قال رسول الله ﷺ من سلک طریقا یلتمس فیه علماسهل الله له به طریقا الی الجنة وما اجتمع قوم فی بیت من بیوت الله یلتون کتاب الله و یتدار سون بینهم الا نزلت علیهم السکینة و گشیتهم الرحمة و حفتهم الملائکة و ذکرهم الله فیمن عنده ومن بطأبه عمله لم یسرع به نسبه

۱۳ قال رسول الله ﷺ ان اثقل شیء بوضع فی میزان المؤمن یوم القیامة خلق حسن وان الله یبغض الفاحش البذی (ترمذی)

۱۴ عن عمر بن الخطابؓ قال قال رسول ﷺ حین سئل عن الایمان ان تؤمن بالله وملائکته وکتبه ورسله و الیوم الاخر وتؤمن بالقدر خیره وشره (مسلم)

۱۵ عن العباس بن عبدالمطلب انه سمع رسول الله ﷺ یقول ذاق طعم الایمان من رضی بالله ربا و بالاسلام دینا و بمحمد ﷺ رسولا

۱۶ عن انس رضی الله عنه قال قال رسول الله ﷺ والذی نفسی بیده لا یؤمن عبد حتی یحب لا خیه مایحب لنفسی (متفق علیه)

۱۷ عن النعمان بن بشیرؓ قال قال رسول ﷺ تری المؤمنین فی تراهمهم و توادهم و تعاطفهم کمثل الجسد اذا شتکی عضو تداعی له سائر الجسد بالسحر والحمی. (متفق علیه)

۱۸ عن عبد الله بن عمرؓ قال قال رسول الله ﷺ بنی الاسلام علی خمس شهادة ان لااله الا الله وان محمدا عبده ورسوله واقام اصلوة وایتاء الزکوة وحج البیت وصوم رمضان. (متفق علیه)

۱۹ عن ابی سعید ن الخدریؓ قال سمعت رسول الله ﷺ یقول من رای منکم منکرا فلیغیره بیده قان لم یستطع فبلسانه فان لم یستطع فبقلبه و ذالک اضعف الایمان. (رواه مسلم)

۲۰ حدیث عبدالله بن عمرؓ ان رسول الله ﷺ قال: کلکم راع وکلکم مسئول عن رعیته فالا میر الزی علی الناس راع وهو مسئول عنهم ولرجل راع علی اهل بیته وهو مسئول عنهم والمرأة راعیة علی بیت زوجها وولده وهی مسئولة عنهم والعبد راع علی مال سیده وهو مسئول عنه الا فکلکم راع وکلکم مسئول عن رعتیه.

COURSE CODE: AHS-112 **ENGLISH** CREDIT HOURS: (2-0) 2

Objective

- This course will enhance English communication skills of students

Course content

Writing Skills	Parts of Speech	Noun, Pronoun
		Verb
		Adverb
		Adjective
		Preposition
		Conjunction
		Interjection
		Subject Verb agreement
	Topic Sentence / Thesis Statement / Types of Paragraphs	Persuasive
		Argumentative
		Descriptive
	Types of Letters	Letter of Complaint
		Letter of Request
		Letter of Application
	Report Writing	Title Page
		Executive Summary
		Abstract
		Letter of Transmittal
		Table of Contents
		List of illustrations
		Main Body
		Glossary
		Appendices
		References
Reading Skills	Choosing what to Read?	Cover Page
		Title Page
		Publishing Details
		Preface / Foreword
		Table of Contents
		List of illustrations
		Chapters
		Index
		Glossary
		Appendices

		References / Bibliography Back Cover
	Techniques of Reading	Skimming
		Scanning
	Comprehension Paragraph	Paragraphs followed by questions
Listening Skills	Movie	Watch a movie and discuss its theme, idea, characterization
Speaking Skills	Presentations	Presentation Skills; Presentation on different topics followed by questions

COURSE CONTENT OF SECOND PROFESSIONAL YEAR

COURSE CODE: M 2001 OCULAR ANATOMY CREDIT HOURS: (02-0.5) 2.5

Objectives

This course will enable students to know the basic anatomy of eye and it helps them to understand basic optics of eye which includes relationship between cornea, lens, aqueous, vitreous, retina and visual cortex.

Course Content

- Orbit
- Eyelids
- Lacrimal apparatus
- Conjunctiva
- Sclera
- Cornea
- Lens
- Aqueous Humor & Vitreous Humor
- Pupil
- Uveal Tract
- Retina
- Optic Nerve
- Extraocular Muscles
- Third, Fourth, Fifth, Sixth and Seventh cranial nerves
- Intra cranial Visual Pathways
- Accommodation
- Binocular single vision
- Intraocular pressure & glaucoma

RECOMMENDED BOOKS

COURSE CODE: M 2002 OCULAR PHYSIOLOGY CREDIT HOURS: (02-0.5) 2.5

Objectives

- Identify and describe the structures and functions of the visual system, eye, and adnexal structures.
- Describe the physiology of the visual system.
- Correctly identify ocular structures around or within the eye
- A strong emphasis is placed on understanding the normal functioning of these tissues so that the student can understand how dysfunction can lead to ocular disease.
- Dynamics of refraction related to different ocular media.

Course Content

1. **ORBIT:**
   - Embryology
   - Globe, size, position & relation to head
   - Facial System & fat
   - Vasculature
   - Lymphatic Drainage

2. **EYELIDS:**
   - Dimensions
   - Physiology
   - Eyelid Movements
   - Hemifacial Spam
   - Blepharospasm

3. **CONJUNCTIVA:**
   - Morphology
   - Stem cells of Ocular surface
   - Dynamics of conjunctiva during eye movements

4. **LACRIMAL SYSTEM:**
   - Lacrimal gland embryology
   - Lacrimal gland & Accessory Glands Physiology
   - Functions of tear film
   - Regulation of main lacrimal gland secretion and meibomian glands
   - Anatomy and physiology of lacrimal excretory system

5. CORNEA:

- Anatomy & development
- Functions of different Layers of Cornea
- Vasculature & nutrition
- Nerve Supply
- Physiology, biochemistry & cell biology of cornea:
- Corneal Transparency
- Refractive role of cornea
- Sclera:
- Gross & cellular anatomy
- Development
- Nerve supply, blood supply & Lymphatics

6. LENS:

- Anatomy & dimensions of adult lens
- Basics of lens transparency & refeaction
- Early development
- Energy production
- water & electrolyte balance
- Changes with aging
- Lens capsule & zonules

7. ACCOMMODATION & PRESBYOPIA:

- Accommodation
- Mechanism of accommodation
- Stimulus of accommodation
- Factors contributing to Presbyopia

8. AQUEOUS HUMOUR / IOP

- Aquous humor production & Composition
- Biochemistry of aquous
- Blood- aquous barrior
- Types of aquous outflow
- Mechanism of IOP maintenance

9. VITREOUS:

- Embryology & anatomy of vitreous
- Biophysical aspects
- Aging of vitreous
- Physiology of vitreous body

10. RETINA:

- Embryology of retina
- Functional organization of retina
- Physiology of different parts of retina
- Rod & cone photoreceptor pathways
- Aging changes
- Electrophysiology & retinal functions

11. VISUAL ACUITY:

- Specifications of stimulus
- Physiological Factors
- Acuity Criteria
- Factors influencing visual acuity
- Binocular single vision
- Stereopsis

12. OPTIC NERVE:

- Topographic anatomy
- Microscopic anatomy
- Blood Supply
- Visual pathway
- Axonal injury at different points along the Visual Pathway

13. PUPIL:

- Physiology of pupil
- Clinical importance of pupil
- Pathway of pupil light reflex & near pupil response
- Relative afferent pupillary defect

14. EXTRAOCULAR MUSCLES:

- Extraocular muscles gross anatomy
- Extraocular muscles gross physiology

15. CARNIAL NERVES RELATED TO EYE:

- Anatomy of 3rd,4th,6th & 7th Cranial nerves
- Intracranial & intra-orbital route of cranial nerves
- Blood supply

16. UVEAL TISSUE:

- Gross anatomy of uveal tissue
- Blood and nerve supply
- Basic functions of different parts of uveal tissue

COURSE CODE: M 2003 OCULAR PHARMACOLOGY CREDIT HOURS: (01-01) 02

Objectives

At the end of Module, students would be capable to understand the; Basic Pharmacological Principals involved in drug selection, administration, management of the dose, adverse effects, contraindications and toxicity handling.

Course Content

1. **Fundamental Concepts in Ocular Pharmacology**
    - Pharmacotherapy of Ocular patients
    - Ophthalmic Drug Formulations
    - Pharmaceutical and Regulatory aspects
    - Legal Aspects of drug utilization

2. **Ophthalmic Drug Delivery**
    - Enteral , Parenteral
    - Local and Modified dosage forms
    - Periocular Administration

3. **Anti-inflammatory Drugs**
    - Non-Steroidal Anti Inflammatory Drugs
    - Corticosteroids
    - Immunosuppressive Agents

4. **Cycloplegics and Mydriatics**
    - Adrenergic Agonists
    - Anti-Cholinergic Drugs

5. **Ocular Hypotensive Drugs**
    - Miotics
    - Beta Blockers
    - Prostaglandins
    - Alpha Adrenergic Agonists
    - Carbonic Anhydrase Inhibitors

6. Anti-Allergy and Decongestants

- Mast cell stabilizers
- Anti-histamines
- Decongestants
- NSAIDs and Other Agents for Allergic Eye Disease

7. Local Anesthetics

- Injectable Anesthesia
- Topical Anesthesia

8. Dyes (Topical and Intravenous)

- Fluorescein sodium
- Rose Bengal
- Indocyanine Green

9. Anti-Infective Drugs

- Antibacterial Drugs
- Antifungal Drugs
- Antiviral Drugs

10. Local and Systemic Side Effects and Toxicity management

11. Orientation to Pharma covigilance

- Patient Safety
- Adverse Reaction Monitoring and Reporting
- Clinical Trial Study

RECOMMENDED BOOKS

- Clinical Ocular Pharmacology (BARTLETT JANNUS) 5TH Edition
- Ocular Theraputics by Ashok Garg 3RD Edition
- Ocular Therapeutic Handbook (A Clinical Manual) Bruce E. Onofrey 2nd Edition
- Lippincott illustrated Reviews Pharmacology Sixth Edition

COURSE CODE: M 2004 OCULAR PATHOLOGY CREDIT HOURS: (02-01) 03

Objectives

This course will enable students

- To be familiar with basic pathological factors involving the ocular tissue.
- To be familiar with pathological feature of all the ocular disease leading to morbidities.
- To be able to screen out the most common blinding disease like cataracts, glaucoma diabetic retinopathy.
- To understand basic ophthalmic workup.
- To identify a pathological condition & to understand pathophysiology of disease.

COURSE CONTENT

1. Orbit

- Introduction
- Infections
    - Pre septal cellulitis
    - Orbital Cellulitis
    - Mucormycosis
- Inflammations
    - Thyroid Eye Disease
    - Idiopathic Orbital inflammatory disease)
- Tumors / Lesion
    - Cystic Lesion
    - Vascular Tumors
    - Lacrimal Gland Tumors
    - Neural Tumors

2. Eyelids

- Introduction
- Disorders of Eyelashes
- Bacterial Infections
- Viral Infections
- Blephritis
- Pathology of Ptosis
- Ectropion / Entropion
- Lid tumors

3. Lacrimal Apparatus

- Introduction
- Acquired Obstructions
- Coupeuital Obstruction
- Dacrocystifis

4. Sclera

- Episcleritis
- Scleritis
  - Immune related
  - Infections
- Blue Sclera

5. Cornea

- Introduction
- Bacterial Keratitis
- Fungal Keratitis
- Viral Keratitis
- Protozoal
- Corneal Ectasia
  - Keratoconus
  - Pellucid Marginal degeneration
- Neurotophic Keratopathy
- Exposure Keratopathy
- Corneal Dystrophies
- Corneal Degenerations

6. Lens

- Pathology of Cataract formations
- Types of cataract
  - Congenital
  - Acquired
- Ectopia Lentis

7. Aquous Humor / IOP & Glaucoma

- Introduction
    - Aquous Production
    - Aquous Outflow
    - IOP
- Types of Glaucoma
    - Open Angle glaucoma (Primary & Secondary)
    - Closed Angle Glaucoma (Primary & Secondary)
    - Pseudoexfliative Glaucoma
    - Pigment dispension glaucoma
    - Lens Induced Glaucoma (Phacoytic, Phacomorphic, Phacoanaphylactic)
    - Normal Tension Glaucoma
    - Ocular Hypertension

8. Uveal Tract

- Classification
    - Anterior
    - Intermediate
    - Posterior
    - Panuveties
- Viral Uveitis
- Fungal Uveitis
- Bacterial Uveitis
- Parasitic Uveitis
- Lens Induced Uveitis
- Sarcoidosis

9. Retina

- Retinal Vascular Occlusion
    - CRVO, BRVO
    - CRAO, BRAO
- Diabetic Retinopathy
- Hypertensive Retinopathy
- Retinopathy of Prematurity
- Macular Disorders
    - Age-related macular depurator
    - Central Searous Chorio-retinopathy

- Degenerative Myopia
- Retinitis Pigmentosa

- Retinal detachments
  - Rhegmatogenous RD
  - Tractional RD
  - Exudative RD

RECOMMENDED BOOKS

- Shafi M. Jatoi : 6th edition
- Kanski : 9th Edition

COURSE CODE: M 2005 EPIDEMIOLOGY CREDIT HOURS: (01-00) 01

Objectives

This course will enable students to

- Explain epidemiology
- Describe basic terminology and concepts of epidemiology
- Analyze public health problems in terms of time, place, and person
- Identify the key components of a descriptive epidemiology outbreak investigation
- Apply epidemiological principles in the field of Optometry/eye-care
- Identify and design the types of research studies

Course contents

1. **Introduction to Epidemiology**
    - What is epidemiology?
    - Definition, scope, and uses of epidemiology
    - Epidemiology and public health
    - Causation of disease
    - Natural history of disease
    - Health status of populations
    - Epidemiologic Triad
    - Scope of epidemiology

2. **Descriptive Epidemiology**
    - Measures of Disease Occurrence
    - Descriptive Epidemiology in Public Health
    - Descriptive Epidemiology in Clinical Epidemiology

3. **Analytical Epidemiology**
    - Definition
    - Types of analytical epidemiology
    - Design Options
    - Follow-Up Studies
    - The Cross-Sectional Study
    - Analytical Epidemiology in Public Health
    - Analytical Epidemiology in Clinical Epidemiology

4. Experimental Epidemiology

- Introduction
- Aims of experimental studies
- The Randomized Controlled Trial (RCT)
- Non-randomized Controlled Trials
- Cohort Studies
- Interventional Studies

5. Observational epidemiology

- Cross-sectional studies
- Case-control studies
- Cohort studies
- Summary of epidemiological studies

6. Epidemiology of ocular Diseases

- Incidence and Prevalence
- Calculating Observation Time
- Mortality and Life Expectancy
- Causes of Diseases

7. Measuring health and disease

- Distribution of eye health problems
- Defining health and disease
- Measuring disease frequency
- Using available information to measure health and disease
- Determination of eye health problems
- Natural history of disease
    - ♦ Definition
    - ♦ Health, Disease, Disability
    - ♦ Stages of disease
    - ♦ Prevention, stages and types

8. Potential errors in epidemiological studies

- Random error
- Sample size
- Systematic error
- Selection bias
- Measurement bias
- Confounding
- The control of confounding
- Odds Ratio
- Validity
- Ethical issues
- Study questions

9. Screening

- Types
- Uses
- Criteria for screening
- Qualities of good screening test
- Sensitivity
- Specificity

10. Sampling

- Introduction
- Types of sampling
  - ♦ Probability Sampling
  - ♦ Non-Probability Sampling
- Advantages of Sampling

RECOMMENDED BOOKS / SUGGESTED READINGS

- An Introduction to Epidemiology for Health Professionals By Jørn Olsen, Kaare Christensen, Jeff Murray, Anders Ekbom. School of Public Health University of California, Los Angeles. DOI 10.1007/978-1-4419-1497-2
- Basic epidemiology by R. Bonita, R. Beaglehole, T. Kjellström. 2nd edition. World Health Organization
- The Epidemiology of eye disease by Gordon J Johnson 2nd edition
- Epidemiology of ocular trauma by B Shukla, Jaypee
- Epidemiology of Ocular Tumors in Children & Adults by Tamara T Mouratova

COURSE CODE: M 2006 COMMUNICATION SKILLS CREDIT HOURS: (00-01) 01

Objectives

- This course will enhance communication skills of students

Course contents

- What is communication
- Elements of Communication Process, levels and types
- Modes of communication , directions
- Gender Difference in communication
- Development of communication skills
- Verbal and Nonverbal communication
- Role of communication in leadership
- Communication with different population
- Enhancing your Communication skills
- Barriers of Communication Process
- Distorted communication
- List of Communication Media
- Group and team process
- Team Approach
- Public relation strategies
- Culture and Cultural Norms
- Definition & Determinants of Health Education
- Principles & methods of Health Education
- Eye Health Education, strategies and promotions
- Counseling skills:
- Types of Counseling
- Process of Counseling
- Role of a Counselor

RECOMMENDED BOOKS

- Carol Taylor, carol Lillis: Fundamental of nursing (2009), 6th Ed. Lippincott, William & Wikkins.
- Potter Perry: Fundamental of Nursing (2009), 7th Ed.

- Carol Taylor, carol Lillis: Fundamental of nursing (2009), 6th Ed. Lippincott, William & Wikkins.
- Potter Perry: Fundamental of Nursing (2009), 7th Ed.

- Eleanor J. Sullivan Philip J. Decker: Effective leadership & management (2009), 7th Ed.
- Kelly. Patricia (2010), Essential of Nursing Leadership & Management (2nd Ed)
- A. k. Khurana: Ophthalmic nursing (2000), 1st Ed.
- Suryakanta- recent advances
- K park- The textbook of preventive and social medicine
- Health education theoretical concepts- WHO
- Business Communication by Peter Hartley and Clive G. Bruck Mann (2002)
- www.impart.org
- www.youtube.com
- www.nrhmharyana.gov.in
- http://www.who.int/mediacentre/factsheets/fs282/en/assessed
- www.nrhmharyana.gov.in

COURSE CODE: M 2008 OPHTHALMIC NURSING CREDIT HOURS: (0.5-0.5) 01

Course content:

1. **Look at the nature of the patient seen in ophthalmic care settings & explore the role of ophthalmic health care personnel.**
    - Introduction of Ophthalmic patient
    - Sight impaired
    - Severely sight impaired
    - Assistance & rehabilitation
    - Assessment of patient
    - Patient information & teaching
    - Communication etiquettes to managing visual impaired or multiple disabilities
    - Special consideration when measuring visual acuity in children
    - Ophthalmic health care professional in OPD
    - Ophthalmic health care professional in emergency
    - Ophthalmic health care professional in community

2. **Basic concepts of general principles & special considerations regarding ophthalmic procedures.**
    - Principles related to general and specific ophthalmic procedures:
        - Communication
        - Patient education
        - Infection control
        - Health and safety
        - Maintenance of patient's privacy and dignity
    - ANTT procedure
    - Principles & protocol for ophthalmic medication, instillation of eye drops & ointment
    - Irrigation of eye
    - Hot & cold compression
    - Pre & post op ophthalmic care

3. **Equip students to recognize infection control practices that prevent the spread of infection**
    - Introduction of Microbiology
    - Terminology used in microbiology
        - Types of microorganisms
        - Microbes benefit humans
        - Types of infection
        - Spread of microbes
        - Course of infection by stages
        - Standard precautions
        - Aseptic techniques
        - Decontamination
            - Cleaning.
            - Disinfection.
            - Sterilization
    - Segregation of waste material in hospital infection control

4. **To understand what information needs to be documented, and the guidelines for documentation.**
        - Purposes of record keeping
        - Common issues in inadequate record keeping
        - Characteristics of record keeping
        - Methods of recording
        - Common record keeping forms
        - Types of reports
        - Change of shift repots.
        - Telephone report.
        - Transfer reports.
        - Incident reports.

5. **Discuss time management in health care setting**
        - Define time management
        - Process of time management
        - Time waste culprits
        - Strategies for effective time management
        - Benefits of time management

6. **Explain health care delivery systems.**
    - Categories of health care setting
    - Types and levels of health care setting
    - Models of integrated health care setting

RECOMMENDED BOOK

- Seema Sood*: Microbiology for Nurses* (2006), 2nd Ed.
- Kelly. Patricia (2010), *Essential of Nursing Leadership & Management* (2nd Ed)
- A. k. Khurana: Ophthalmic nursing (2000), 1st Ed.
- Eleanor J. Sullivan Philip J. Decker: Effective leadership & management (2009), 7th Ed.
- Carol Taylor, carol Lillis: *Fundamental of nursing* (2009), 6th Ed. Lippincott, William & Wikkins.
- Potter Perry: *Fundamental of Nursing* (2009), 7th Ed.
- Kozier & Erb's: *Fundamental of Nursing* (2008), 8th Ed.
- Wolter Kluwa: *Fundamental of Nursing, Incredibly easy* (2000), South Asia Edition, Lippincott, William & Wikkins.
- Jones. A Rebecca (2007), *Nursing Leadership and Management* (retrieve on Aug, 2012)
- Atlas, M, R. (1989). ***Microbiology*.** New York: McMillan Publishing.
- Bocock, J. E. (1972). ***Microbiology for Nurses***. London: Bailliere Tindall.
- Colee, J. G. (1981). ***Applied Medical Microbiology***. New York: Blackwell Scientific.
- Gladwin, M. (1997). ***Clinical Microbiology made ridiculously simple*.** Singapore: Med Master.
- Gupte, S. (1990). ***Practice Microbiology***. New Delhi: Jaypee Brothers Medical.
- Hare, R. (1980). ***Bacteriology and Immunity for Nurses***. London: Longman Group.
- Inglis, J. J. T. (1996). ***Microbiology and Infection***. New York: Churchill Livingstone.
- Jawetz, R. (1992). ***Medical Microbiology***. London: Appleton and Lange.
- Parker, M. J. (1978). ***Microbiology for Nurses***. London: Bailliere Tindall.
- Stucke, A. V. (1993). *Microbiology for Nurses*. London: Bailliere Tindal.
- Mary E. Shaw and Agnes Lee. (2010), 4th Edition. *Ophthalmic Nusing*. Wiley-Blackwell

COURSE CODE: M 2014 BASIC OPTICS & REFRACTION CREDIT HOURS: (1.5-1.5) 03

Objectives

This course will enable students to

- Understand the nature of light and its application.
- Differentiate refracting surfaces i.e. lenses and mirrors
- Describe the sensitivity of eye to visible spectrum of light

Course content:

1. **Nature of light**
    - Dual nature of light
    - Particle nature of light
    - Electromagnetic wave nature

2. **Properties of light**
    - Medium of propagation
    - Speed of light
    - Velocity and frequency of light

3. **Electromagnetic spectrum**
    - Visible spectrum
    - Invisible spectrum
    - Visible light and the eye

4. **Resolving power of the eye**
    - Limit of resolution
    - Test of visual acuity
    - Near visual acuity testing

5. **Optical medium**
    - Plain mirrors
    - Concave mirrors
    - Concave mirrors
    - Lenses
    - Prisms

6. **Practical demonstration:**
    - Snellen's chart construction
    - Image formation by mirrors
    - Image formation by lenses
    - Image formation by prisms

RECOMMENDED BOOKS

- Theory and practice of Optics and refraction (By AK Khurana, fourth edition)
- Clinical optics (By A.R. Elkiington, H.J. Frank, third edition)
- Duke-Elder's Practice of Refraction (Revised by David Abrams, tenth edition)
- Hand book of optics (optical society of America, Second edition)

COURSE CODE: M 2015 GEOMETRICAL OPTICS CREDIT HOURS: (1-1) 02

Objectives

This course will enable students to

- Understand image formation through different types of optical media.
- Identify optical defects in image formation.
- Describe pattern of magnification through different types of lenses and prisms

Course Content:

1) **Reflection of light**
    - Reflection through plane mirror
    - Reflection through spherical surfaces
    - Reflection through parabolic surfaces
    - Laws of reflection
    - Retro reflection
    - Calculation of magnification after reflection

2) **Refraction of light**
    - Laws of refraction
    - Refraction through plane media
    - Refraction through curved surfaces

3) **Prisms**
    - Refraction through prisms
    - Angle of deviation and dispersion
    - Clinical applications of prisms
    - Dispensing of prisms
    - Decentration and prismatic effect

4) **Vergences**
    - Dioptric power of lenses
    - Reduced vergences and reduced thickness
    - Coaxial system of spherical surfaces

5) **Magnification**
    - Types of magnification
    - Magnification of cylinder, sphere and toric surfaces
    - Clinical application of magnification

6) **Vertex power**
    - Front and back vertex power
    - Vertex distance

PRACTICAL IN OPTICAL LAB

- Spherical lenses
- Cylindrical lenses
- Prisms
- Magnification
- Magnifiers
- Dispensing of lenses

RECOMMENDED BOOKS

- Theory and practice of Optics and refraction By AK Khurana (fourth edition)
- Clinical optics By A.R. Elkiington, H.J. Frank (third edition)
- Duke-Elder's Practice of Refraction, Revised by David Abrams (tenth edition)
- Hand book of optics (optical society of America) Second edition

COURSE CODE: M 2016 PHYSICAL OPTICS CREDIT HOURS: (1.5-1.5) 03

Objectives

This course will enable students to

- Understand problems of Ametropia
- Identify refractive errors
- Perform preliminary eye examination and refraction

Course content:

1) **Phenomena based on wave optics**
    - Interference
    - Diffraction
    - Glare testing
    - Polarization
    - Stereoscopic vision

2) **Optical system of the eye**
    - Components of the eye's optical system
    - Power of eye's optical system

3) **Schematic eye**
    - Cardinal data of schematic eye
    - Reduced eye

4) **Retinal image size**
    - Image size in Ametropia
    - Catoptric images
    - Axes and visual angles of the eye

5) **Optical aberrations**
    - Spherical aberrations
    - Chromatic aberrations
    - Correction to aberrations

6) **Optics of Ametropia**
    - Emetropization
    - Myopia
    - Hypermetropia
    - Astigmatism
    - Presbyopia

- Aphakia
- Anisometropia
- Amblyopia

7) Accommodation

- Convergence
- Accommodative convergence
- Accommodative lag and lead

8) Refraction

- Subjective and objective refraction
- Cycloplegic refraction
- Auto refraction
- Post refraction tests
- Binocular balancing

9) Corrective lenses

- Lens materials
- Lens forms
- Lens shapes and powers
- Lens surfacing and tinting
- Lens centration
- Lens decentration
- Contact lenses

Practical:

- Stereoscopic vision
- Reduced eye
- Refraction
- Objective refraction and subjective refraction
- Auto refraction
- Cycloplegic refraction
- Post refraction test
- Prisms
- Optical dispensing
- Lens cutting and centering

RECOMMENDED BOOKS

1) Theory and practice of Optics and refraction (By AK Khurana, fourth edition)
2) Clinical optics (By A.R. Elkiington, H.J. Frank, third edition)
3) Duke-Elder's Practice of Refraction (Revised by David Abrams, tenth edition)
4) Hand book of optics (optical society of America)

COURSE CODE: M 2017 ADVANCE VISUAL OPTICS CREDIT HOURS: (1.5-01) 2.5

Objectives

This course will enable students to

- Learn basic principles and optics of various lenses.
- Learn advance visual optics and skills.

Course content:

1. **Corrective lenses including contact lenses, ocular spectacle refraction.**
    - Describe definitions of Lenses, corrective lenses and others.
    - Discuss ocular refraction principles and spectacle refraction

2. **Convergence and divergence.**
    - Describe definition and types of convergence and its anomalies.
    - Describe definition of divergence and its anomalies along with types.

3. **Causes of refractive error, objective measurement of visual acuity.**
    - Describe causes and symptoms of refractive errors
    - describe assessment of visual acuity.

4. **Uses of prisms.**
    - definition, optics and uses of prisms.
    - definition, optics and uses of prisms

5. **Optics of low vision aids.**
    - Define Optical properties of LVD's
    - Demonstrate Optical properties of LVD's

6. **Retinoscopy - principal and methods.**
    - draw and learn optics of retinoscopy
    - discuss its principal and methods to use

RECOMMENDED BOOKS

- Clinical Optics (By A.R. Elkington, Third edition)
- Theory and practice of Optics and refraction (AK Khurrana, Second Edition)
- Brien Holden Vision Institute- student manual (Hasan Minto, P Bashyarangan, R P Ghoshal Meera, Deepak Kumar)

COURSE CODE: M 2018 ADVANCE VISUAL FUNCTIONS CREDIT HOURS: (02-00) 02

Objectives

By the end of this module, students should be able to:

- Understand visual functions and the use of different charts in different age groups
- Measure Visual functions accurately.
- Analyze the results in order to proceed with further investigative procedures based on the results of the tests performed
- Manage refractive errors, visual field defects, glare, contrast sensitivity, color vision anomalies.
- Diagnose measure and manage binocular single vision defects.

Course content:

1. **Principals of Visual functions**
    - Visual acuity, visual fields , color vision ,contrast sensitivity, glare sensitivity - Definitions, principal, different charts used/ instruments used to measure these visual functions.

2. **Refractive errors**
    - Types of refractive errors- Myopia, Hyperopia, Astigmatism, Presbyopia
    - Diagnosis and management of Refractive errors

3. **Binocular Single Vision assessment**
    - Binocular Single Vision –Grades of BSV, tests performed to measure different grades of BSV, assessment and management of BSV.

4. **Heterophoria**
    - Definition, types, diagnosis & measurement of of different types of Heterophoria.

RECOMMENDED BOOKS

- Clinical Optics (Third Edition) by Andre R. Elkington, Helena J. Frank, Michael J. Greany
- Theory and practice of optics and refraction by AK Khurana
- Clinical Orthoptics by Fiona Rowe
- Clinical Ophthalmology by jaypee

COURSE CODE: M 2019 INCLUSIVE EYE HEALTH BASICS CREDIT HOURS: (1.5-00) 1.5

Objectives

This course will enable students to

- Understand the broader context of inclusion
- Develop a change in attitudes and behaviors towards practicing inclusive eye health
- Understand the principles of child safeguarding and safeguarding of 'adults at risk' and how they relate to everyday clinical practice

Course content:

1. **Inclusion**
    - What does inclusion mean
    - What does social exclusion mean
    - Help students to understand that inclusion and exclusion are relevant to any factor causing marginalization, including disability, gender, age, poverty, ethnicity, religion, access to education.
    - Change that students will make to their ways of working to improve inclusive practices
    - Show a short video on examples of exclusion and inclusion

2. **Disability**
    - What is meant by impairment
    - What is meant by disability
    - Provide examples of different types of impairments and how they relate to being disabled or not
    - Provide a historical perspective of use of different terms like challenged, differently abled, special persons, and the universal acceptance of the term disability and how it should be used
    - Explain what is meant by 'Person with Disability' rather than 'Disabled Person'

3. **Accessibility 1**
    - What is meant by accessibility
    - What are some of the accessibility options
    - What are barriers to accessibility
    - What does barrier free access mean, including relating to financial barriers

4. **Accessibility 2**
    - Describe principles of accessibility

5. **Accessibility 3**
    - What are the implications of accessibility for people who are blind
    - What are the implications of accessibility for people with low vision
    - What are the implications for people with other impairments and also multiple impairments
    - In the context of inclusion, what is meant by attitudes, behaviors and practices

6. **Communication**
    - Essential vocabulary of the Pakistan Sign Language for every clinician and health professional
    - Confidence in communicating with people with all types of impairments and from other language groups

7. **Child and 'adults at risk' Safeguarding**
    - What is meant by child safeguarding
    - What is the difference between child safety, child safeguarding and child rights
    - In what circumstances are adults at risk
    - What is meant by 'adults at risk' safeguarding
    - Conclude by describing best practices for child safeguarding in clinical practice
    - What steps should be taken to ensure safeguarding of 'adults at risk'
    - Adults at risk: students should be able to identify young women or men with sensory, intellectual or psycho-social disabilities as being at heightened risk of physical, sexual and emotional abuse and also neglect. And also those in emergency situations.
    - Steps include: staff training, two person rule, counseling of patient and family members

Recommended books / Publications

- INCLUSION MADE EASY © CBM A quick program guide to disability in development
  Link to book;
  https://www.cbm.org/fileadmin/user_upload/Publications/cbm_inclusion_made_easy_a_quick_guide_to_disability_in_development.pdf
- INCLUSION MADE EASY IN EYE HEALTH PROGRAMS Disability inclusive practices for strengthening comprehensive eye care
- https://www.cbm.org/fileadmin/user_upload/Publications/CBM-DID-TOOLKIT-accessible.pdf
- Disability as Diversity, A Guidebook for Inclusion in Medicine, Nursing, and the Health Professions, Editors: Meeks, Lisa M., Neal-Boylan, Leslie (Eds.)
- Inclusive Health Promotion: Public Health Remedy for People with Disabilities Paperback – by Rebecca Mabaso
- Inclusive Practice for Health Professionals 1st Edition by Jenny Davis, Melanie Birks, Ysanne Chapman

COURSE CONTENT OF THIRD PROFESSIONAL YEAR

COURSE CODE: M 3001 **PRIMARY HEALTHCARE & PRIMARY EYE CARE** **CREDIT HOURS: (1.5-0) 1.5**

Objective

After successful completion of this course, students will be able to;

- Define Primary Health Care (PHC) and Primary Eye care (PEC)
- Apply principles of Primary Eye Care at all levels of community
- Enlist essential elements and components of PHC and PEC
- Considerate on how to deal with everyone's health in the community
- Identify and allocate resources for eye health towards universal coverage
- Comprehend the basic structure of national eye care programs/planning
- Orientate Aims and objectives of Vision 2020

Course Content (Part 01):

1. **Primary Health Care (PHC)**
    - Definitions and Concepts

2. **Elements of PHC**
    - Promotive
    - Preventive
    - Curative
    - Rehabilitative

3. **Basic strategies of healthcare**
    - Health education,
    - Health promotion,
    - Counseling

4. **Essential components of PHC**
    - Education concerning main health problems
    - Promotion of food supply and good nutrition
    - Adequate supply of safe water and basic sanitation
    - Maternal and child health, and family planning
    - Immunization against major infectious diseases
    - Prevention and control of local endemic diseases
    - Appropriate treatment of common diseases and injuries
    - Provision of essential drugs.

5. **Fundamental components of PEC**
    - Eye health education.
    - Symptom identification.
    - Visual acuity measurement.
    - Basic eye examination.
    - Diagnosis.
    - timely referral

6. **Primary Eye Care (PEC)**
    - Integration of primary eye care into primary health care
    - Establishment of an eye care network / referral system
    - Recording and reporting in PHC /PEC

7. **PEC workshops**
8. **PEC curriculum**

Course Content (Part 02):

9. **National Demography**
    - National health indicators
    - Eye health indicators

10. **Overview of blindness**
    - WHO Classification of low vision and blindness
    - Magnitude of Blindness - At global, regional and national level

11. **Major causes of global & regional and National blindness**
    - Special high risk groups

12. **Situation Analysis of existing resources for the prevention of Blindness**
    - Human Resource
    - Infrastructure

13. **Orientation to Vision 2020 (the Global Initiative)**
14. **Overview of the National Health Program**
    - Overview of the National Program on prevention of blindness
    - History of the national prevention of blindness program (vertical and horizontal programs)
    - Structure of the national eye health delivery system

15. **Team Approach to Prevention of Blindness**

RECOMMENDED BOOKS

- Basic of Community Ophthalmology code, 2427, AIOU
- Optometry Primary care 2nd ED, Venor Phd Theodore p. Gros, AIOU
- Eye Disease in hot climates, by Smith. John, Oxford
- Repaid Diagnosis in ophthalmology Pediatric ophthalmology Strabismus, Strominger Mithchel, Mosby
- Pediatric Ophthalmology, Wilson, M. Edward, Springer
- Chicago eye emergency manual, John, Thomas, Jaypeey
- Essentials of Patients Education, Bastable, Susans, John Bartlett
- Anterior Disease and therapeutics 2nd ED. Bruce, Adrian N.Y

COURSE CODE: M 3002 INCLUSIVE EYE HEALTH INTERMEDIATE CREDIT HOURS: (1-0.5) 1.5

Objective

After successful completion of this course, students will be able to;

- Understand the principles of the UNCRPD and SDGs and their implications for health professionals
- Understand the role of DPOs, rehabilitation services and Universal Design in relation to inclusive eye health
- Understanding a Code of Conduct for Child safeguarding and for 'adults at risk'

Course Content:

1. **Refresher of the Basic Module**
   - Inclusion and social exclusion – concepts and principles for health professionals
   - Disability and Impairment – societal attitudes and practices; social barriers
   - Accessibility – recalling what we mean by barrier free access

2. **UNCRPD 1 and SDGs**
   - Origins of the Convention
   - What are its articles and principles
   - What does the Convention mean in practice
   - What are Sustainable Development Goals and which ones incorporate disability

3. **UNCRPD 2**
   - Group work. Group feedback and discussion on selected Articles

4. **Disabled Persons Organization**
   - What is a DPO
   - What roles do DPOs play in society
   - How can clinical services and health professionals interface with DPOs
   - How can the health community and DPOs work together to promote inclusive eye health practices

5. **Communication**
   - Recalling Essential Pakistan Sign Language Vocabulary for Clinicians and Health Professionals
   - Recalling Confidence in communicating with people with all types of impairments and from other language groups

6. **Habilitation**
    - What is the difference between 'Habilitation' and 'Rehabilitation'
    - Who provides rehabilitation services and how are these services structured
    - Adaptive technology used in low vision (IABP list)
    - What role can health professionals play in access to rehabilitation
    - How can two-way referral networks be established between eye health and rehabilitation services

7. **Universal Design 1**
    - What is meant by Universal Design
    - What implications does this have for health professionals
    - How can we apply Universal Design to eye care services
    - The concepts of Universal Design with examples– e.g. signage, street furniture, pathways, parking, ramps, elevators, lifts, washrooms, railings, handrails, entrances, colour contrast /codes, tactile floor pads/tiles etc. in a health facility

8. **Universal Design 2**
    - Group work, Group feedback and discussion on Universal Design

RECOMMENDED BOOKS

- INCLUSION MADE EASY © CBM A quick program guide to disability in development Link to book; https://www.cbm.org/fileadmin/user_upload/Publications/cbm_inclusion_made_easy_a_quick_guide_to_disability_in_development.pdf
- INCLUSION MADE EASY IN EYE HEALTH PROGRAMS Disability inclusive practices for strengthening comprehensive eye care
- https://www.cbm.org/fileadmin/user_upload/Publications/CBM-DID-TOOLKIT-accessible.pdf
- Disability as Diversity, A Guidebook for Inclusion in Medicine, Nursing, and the Health Professions, Editors: Meeks, Lisa M., Neal-Boylan, Leslie (Eds.)
- Inclusive Health Promotion: Public Health Remedy for People with Disabilities Paperback – by Rebecca Mabaso
- Inclusive Practice for Health Professionals 1st Edition by Jenny Davis, Melanie Birks, Ysanne Chapman

COURSE CODE: M 3003 **ADVANCED REFRACTION AND RETINOSCOPY** **CREDIT HOURS: (2-1.5) 3.5**

Objective

After successful completion of this course, students will be able to;

- Identify refractive errors by objective and subjective examination techniques
- Manage or give treatment to patients with Ametropia.
- Perform retinoscopy, cross-cylinder, binocular balancing, Maddox rod and wing etc.

Course content:

1. **Refractive errors**
    - High myopia
    - High hypermetropia
    - Anisometropia
    - Aphakia
    - Pseudophakia

2. **Astigmatism**
    - Regular astigmatism
    - Irregular astigmatism

3. **Refraction**
    - Objective refraction
    - Retinoscopy
    - Dynamic retinoscopy and accommodative lag
    - Cycloplegic refraction
    - Auto-refraction
    - Subjective refraction

4. **Transposition**
    - Simple spherical transposition
    - Toric transposition

5. **Post refraction test**
    - Optics of Maddox rod
    - Optics of Maddox wing test
    - Cross cylinder
    - Vertical prism test
    - Fogging technique
    - Duo-chrome test

6. **Binocular Balancing**
    - Cutting cylinder and spherical equivalent
    - Determination of cylindrical power and axis

7. **Options for corrective lenses**
    - Simple spherical lenses
    - Combination of lenses
    - High index lenses
    - Lenticular lenses
    - Contact lenses for anisometropia

PRACTICALS

- Retinoscopy
- Dynamic retinoscopy
- Maddox road
- Maddox wing
- Cross cylinder
- Auto-refractor
- Objective refraction
- Subjective refraction
- Selection of lenses

RECOMMENDED BOOKS

- Theory and practice of Optics and refraction, By AK Khurana (fourth edition)
- Clinical optics By A.R. Elkiington, H.J. Frank, (third edition)
- Duke-Elder's Practice of Refraction, Revised by David Abrams (tenth edition)
- Hand book of optics (optical society of America) Second edition

COURSE CODE: M 3004 **AVOIDABLE & UNAVOIDABLE CAUSES OF BLINDNESS** **CREDIT HOURS: (01-00) 02**

Objective

After successful completion of this course, students will be able to;

- Identify and diagnose common community eye diseases
- Infer and plan outreach community screening camps

Course Contents

Part 01: Primary eye care management of:

- Cataract
- Refractive Errors & Low Vision
- Glaucoma
- Diabetic Related Blindness
- Trachoma
- Vitamin A Deficiency Disease
- Trauma
- Corneal Opacities
- ROP
- Trachoma
- Childhood blindness

Part 02: Community Assignment / field work

RECOMMENDED BOOKS

- Basic of Community Ophthalmology code, 2427, AIOU
- Optometry Primary care 2nd ED, Venor Phd Theodore p. Gros, AIOU
- Essentials of Patients Education, Bastable, Susans, John Bartlett
- Anterior Disease and therapeutics 2nd ED. Bruce, Adrian N.Y

COURSE CODE: M 3006 BASIC DISPENSING OPTICS CREDIT HOURS: (02-01) 03

Objective

On the successful completion of this course students should be able to:

- Be aware of the introduction of the dispensing optics
- Define types and forms of the lenses and assess when these are required in different scenarios
- Define Bifocals its types, construction, indication, advantages, disadvantages
- Define Aphakic lenses. What are the drawbacks of these lenses.
- Define the safety lenses and in which conditions they are required.
- Identify frame its parts, types, shapes and its material.
- Describe prismatic effect and concept of centration and de-centration in glasses.
- Define foci-meter, identify its optics, uses and operate a foci-meter to find the prescription of the glasses.

Course Contents

- Components of spectacle prescription & interpretation, transposition, Add and near power relation
- Frame selection – based on spectacle prescription, professional requirements, age group, face shape
- Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
- safety lenses: materials
- Aphakic lenses, High plus lens design, Aspheric design
- Neutralization – Hand & lensometer, axis marking, prism marking
- Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)
- Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories – Bands, chains, boxes, slevets, cleaners, screwdriver kit
- Antireflection coatings
- Special types of spectacle frames
    - Monocles
    - Ptosis crutches
    - Industrial safety glasses, Welding glasses
- Focimeter
- FAQ's by customers and their ideal answers

RECOMMENDED BOOKS

- *Brooks C. W, Borish I. M, Systems for Ophthalmic Dispensing*

COURSE CODE: M 3007 OPHTHALMIC INSTRUMENTS & THEIR MANAGEMENT CREDIT HOURS: (2.5-0.5) 03

Course Contents

1. **Slit Lamp Bio-Microscope**
    - Slit lamp findings
    - Illumination techniques
    - Basics of slit lamp microscopy
    - Introduction/history of slit lamp.
    - Uses of slit lamp and instructions for use
    - Slit lamp imaging
    - Optics of slit lamp
    - Procedure / how to perform
    - Problematic examination
    - Contact lens evaluation
    - The post-operative eye
2. **Direct Ophthalmoscope**
    - Basic concepts of ophthalmoscope
    - Optics of ophthalmoscope
    - Principles of ophthalmoscope
    - Procedure
3. **Indirect Ophthalmoscope**
    - Principles of indirect ophthalmoscope
    - History of ophthalmoscope
    - procedure
    - Uses of ophthalmoscope
4. **Keratometer**
    - Principles of keratometer
    - Types of keratometer
    - Uses of keratometer
    - Optics of keratometer
5. **Fundus Camera**
    - Principles
    - Parts of fundus camera
        - Optical
        - Mechanical parts
    - Uses of fundus camera
    - Purpose of use

6. **Perimetery**
    - Examination methods
    - Methods of stimulus presentation
        - Static perimetery
        - Kinetic perimetery
    - How to perform in children

7. **Tonometry**
    - Definition of tonometry
    - Overview of ocular tonometry
        - Methods
        - influencing factors
    - Optics of tonometry
    - Uses of tonometry

8. **Focimetery**
    - Definition
    - How to use focimeter
    - Optics of focimeter

9. **B-Scan**
    - Principles of B-scan
    - Probe orientation
    - Procedure
    - Uses of ophthalmic ultrasound
    - Basics of B-scan
        - Scan orientation
        - Dynamic Scan

RECOMMENDED BOOKS

- Ultrasound of the eye and orbit (Sandra frazier byrne ronald L.Green, 2ND ADDITION)
- The slit lamp primer (Anice K ledford valerie sanders, 2ND ADDITION)
- Components of spectacle prescription & interpretation, transposition, Add and near power relation

COURSE CODE: M 3008 CONTACT LENSES CREDIT HOURS: (02-01) 03

Objective

This course enables students to;

- Describe the mechanical and physiological eye-lens relationship
- Explain the selection of contact lens clients
- Select proper fitting modality
- Select appropriate and adapted care and maintenance modality
- Apply various philosophies underlying simple contact lens fitting
- Utilize the equipment involved in contact lens fitting procedures
- Apply procedures used in contact lens fitting
- Identify contact lens related complications

Course Contents

1. **Corneal Anatomy & Physiology WRT Contact Lenses**
2. **Patient selection**
    - History Taking with respect to contact lenses
    - Examination of the Anterior Segment The Routine Preliminary Examination
    - Introduction to Contact Lens Fitting
    - Corneal Topography: Measurement and Significance
3. **Contact lens materials**
    - Contact Lens Materials
    - Indications and contraindications of contact lenses
4. **Corneal lenses – fitting philosophies**
    - Fitting Spherical Rigid Gas Permeable Contact Lenses
    - The Effects of RGP Parameter Changes on Lens Fitting
    - Fitting Spherical Soft Contact Lenses
5. **Corneal lenses optics & Manufacturing**
    - The Optics of Contact Lenses
    - Soft Contact Lens Design
    - Rigid Gas Permeable Contact Lens Design

6. Considerations in contact lens wear

- Options for Wear Modality and Lens Replacement
- Microbiology and Contact Lens Wear
- Ocular Host Defense Systems and Contact Lens Wear

7. Lens care solutions and their use

- Contact Lens Care and Maintenance
- Contact Lens Contamination and Lens Deposits
- Contact Lens Care Products: Properties and Performance
- Care and Maintenance of GP Contact Lens
- Care and Maintenance of Hydrogel and Contact Lenses

8. Contact lens aftercare procedures-Teaching the patient to use contact lenses

- Lens Dispensing and Patient Education
- Conducting the After-Care Visit
- Slit-Lamp Examination of the Contact Lens Patient

9. Contact lenses for special purposes

- Contact Lenses and Sport
- The Working Environment and Contact Lenses

RECOMMENDED BOOKS

1. International Association of Contact Lens Educators (IACLE) Course Materials. Available at: http://iacle.org/joomla/index.php/73-free-resources/free-resources/262-download-the-iacle-contact-lens-course
2. Gasson A, Morris JA. The Contact Lens Manual: A Practical Guide to Fitting; Butterworth-Heinemann; 2010.
3. Bennett ES, Weissman BA. Clinical Contact Lens Practice, Lippincott Williams & Wilkins; 2004.
4. Bennett ES, Henry VA, Clinical manual of contact lenses, Philadelphia, Pa. Wolters Kluwer Health/Lippincott Williams & Wilkins 2013.
5. Phillips AJ, Speedwell L. Contact Lenses, Edinburgh ; Butterworth-Heinemann; 2007.
6. Franklin A, Franklin N. Eye Essentials: Rigid gas-Permeable Lens Fitting, Butterworth-Heinemann; 2006.
7. Franklin A, Franklin N. Eye Essentials: Soft Lens Fitting, Butterworth-Heinemann; 2006.
8. Efron N. Contact Lens Practice. Butterworth-Heinemann; 2010.
9. Douthwaite, W.A. Contact Lens Optics and Lens design. Butterworth-Heinemann; 2006.

RECOMMENDED TEXTS

- DeMilton Hom, Manual Of Contact Lens Prescribing And Fitting
- Bennett, ES, Hom, MM. Manual of Gas Permeable Contact Lenses, 2/e, Butterworth Heinemann/Elsevier Science, 2004
- Scheid, TR. Clinical Manual of Specialized Contact Lens Prescribing, Butterworth-Heinemann, 2002.

COURSE CODE: M 3009 **LOW VISION** **CREDIT HOURS: (02-01) 03**

Objective

This course deal with the definition of low vision, epidemiological aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive optical, non-optical and electronic devices for visually challenged people, art of prescribing low vision devices and training the low vision clients along with other rehabilitation measures.

This course enables students to;

- Describe Low Vision and epidemiology of Low Vision.
- Perform Clinical examination of Low vision subjects.

Course Contents

1. **Introduction to Low vision, basic terminology**
   - Describe WHO definition of LV.
   - Comprehend Classification of LV.

2. **Epidemiology of low vision, Model of low vision service**
   - Describe prevalence of LV.
   - Describe Epidemiology and low vision services at different levels.

3. **Pre-clinical evaluation of low vision patients.**
   - Perform pre-clinical evaluation procedure of LV clients.
   - Assess causes and symptoms of LV clients.

4. **Prognostic & psychological factors; psycho-social impact of low vision**
   - Enlist Psycho – social impacts of LV.
   - Enlist educational and functional impacts of LV.

5. **Optics of low vision aids.**
   - Define Optical properties of LVD's.
   - Demonstrate Optical properties of LVDs.

6. **Group discussion**
   - Draw optics of different LVD's.
   - Illustrate optics of different LVD's.

7. Clinical Assessment of Low Vision clients.

- History taking and review of medical response.
- Assess VA, PHVA, and Refraction.
- Describe assessment methods of colour vision, contrast sensitivity, glare sensitivity and visual field.
- Additional tests (Cover/Uncover, Ophthalmoscopy)
- Magnification (types of magnification, methods to calculate magnification, magnification of different types of low vision devices.

8. Legal aspects of Low vision in Pakistan and internationally.

- Define National and international Laws for partially sighted.
- Enlist National and international law for partially sighted.

9. Understanding the Psychology of low vision subjects.

- Understand the Psychology of LV subjects
- illustrate psychological needs of LV subjects.

10. Low Vision Counseling in school going children.

- Perform Low Vision Counseling in school going children.
- Describe needs of school going children

RECOMMENDED BOOKS

- Low Vision Principles and Practice Low vision care, 4th edition by Christine Dickinson (1998)
- Practice of Low vision – A guide book by E Vaithilingam (2012)
- Brien Holden Vision Institute- student manual by Hasan Minto, P Bashyarangan, R P Ghoshal Meera, Deepak Kumar
- Understanding Low vision by Jose RT (1983)

COURSE CODE: M 3010 **OCULAR MOTILITY & BINOCULAR SINGLE VISION** **CREDIT HOURS: (01-0.5) 1.5**

Objective

This course deal with the definition of binocular single vision, ocular motility and disorders, clinical approach of squint patients, amblyopia and its latest treatment modalities and nystagmus.

Course Contents

1. **Ocular motility and dysfunctions**
    - Disorders of ocular motility
    - Investigating motility disorders
    - Functions of extra ocular muscles
    - Amblyopia
    - Latest treatment modalities in amblyopia
    - Nystagmus

2. **Binocular single vision**
    - Diplopia
    - ARC
    - Investigation of heterophoria
    - Investigation of commitant deviation
    - Investigation of incommitant deviation
    - Convergence anomalies
    - Management of phorias

RECOMMENDED BOOKS

- Binocular vision anamolies, (5th edition, Pickwells)
- Binocular vision and anamolies (Bruce evan)
- Clinical management of binocular single vision, (Second edition, Mitchell scheiman)
- Clinical orthoptics (Fiowna roew)

COURSE CODE: M 3011 ORTHOPTICS TECHNIQUES CREDIT HOURS: (01-0.5) 1.5

Objective

This course deal with the clinical techniques of dealing with squint patients. Investigating type of squint and amount of squint and non-surgical management of squint.

Course Contents

1. **Common orthoptic procedures**
    - Visual aquity
        - Visual aquity assessment in pre-verbal
        - Visual aquity assessment in Toddler
        - Visual aquity assessment in school going children
        - Visual aquity charts, testing distance, principle
    - Cover uncover test
        - Principles
        - Procedure
        - Results
    - Extra ocular motility testing
        - Procedure
        - Types of Extra ocular motility
    - Near point of convergence
    - Krimsky
        - Principles
        - Procedure
        - Results

RECOMMENDED BOOKS

- Binocular vision anamolies, (5th edition, Pickwells)
- Binocular vision and anamolies (Bruce evan)
- Clinical management of binocular single vision, (Second edition, Mitchell scheiman)
- Clinical orthoptics (Fiowna roew)

COURSE CODE: M 3012 PATIENT DEALING ETHICS CREDIT HOURS: (1.5-0.5) 02

Objective

After successful completion of the course students should be able to:

- To understand the importance of ethics and professionalism in the practice of optometry to deal patients/community members positively
- To apply the principles of medical ethics (Autonomy, Beneficence, Non-Maleficence, Justice and collegiality) to enhance ethical standards of professionalism in optometry practices
- To comprehend ethical and legal concepts relating to informed consent, decision making capacity and paternalism to learn to exercise autonomy of a patient/research subject
- To apprehend ethical and legal concepts relating to confidentiality to win confidence of patients/ community and maintain data safety
- To compile ideas how students can practice principles of Beneficence, Non-maleficence, veracity and truthfulness in field of optometry for welfare of patient, institution and society
- To analyze principles of Justice to ensure allocation of scarce medical resources in eye care services
- To develop a relationship of confidence and trust with patients to make treatment plan successful
- To apply Molyneux's ethical decision making model in order to resolve the medical ethical dilemma at clinical, hospital or community level
- To differentiate between law and ethics to enhance their focus on internal moral standards
- To generate a code of ethics in light of all principles, models and theories for future optometry practices
- To collect information of corneal banking social and ethical complex and relate them to country specific situations
- To explicate public health ethics in order to understand outreach optometry prospects

Course Contents

1. **Introduction to Ethics**
    - Definitions of ethics and medical ethics
    - Difference between Law and Ethics
    - Moral values and Ethics in perspective of Trolley Problem

2. **Theories of Medical Ethics**
    - Deontological
    - Teleological
    - Principalism
    - Virtual based approaches

3. **Ethical Principles**
    - Autonomy
    - Informed Consent
    - Patient's Decision making Capacity
    - Confidentiality
    - Veracity
    - Paternalism
    - Beneficence
    - Non-maleficence
    - Fidelity
    - Justice

4. **Resolving ethical dilemmas while dealing with patients**
    - Molyneux's ethical decision-making model for a health professional
    - Difficulties in Health care arena
    - Absolute or partial applications of Principles

5. **Dealing with angry and uncooperative patients**

6. **Code and oath of Ethics**
    - Introduction to Hippocratic Oath
    - Optometry code of ethics
    - The optometric (Orthoptics and Investigative Oculist) Oath ceremony
    - Professional integrity

7. **Standards of ethical conduct in specialized fields;**
    - Clinical Research involving human beings
    - Social and ethical issues of Corneal Banking
    - Ethical values in Low Vision Rehabilitation

8. **Public health ethics**
    - Definitions of public health reporting & public health surveillance
    - Ethical framework of public health

RECOMMENDED BOOKS / ARTICLES

- An optometrist's guide to clinical ethics edited by r. Norman bailey, o.d. Elizabeth heitman, ph.d.
- Clinical Ethics: A Practical Approach to Ethical Decisions in Clinical Medicine, 8e Albert R. Jonsen, Mark Siegler, William J. Winslade
- https://www.aoa.org/about-the-aoa/ethics-and-values?sso=y
- http://www.journalofoptometry.org/en-ethics-in-optometric-practice--articulo-S1888429608700554
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446875/
- https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-10-638

COURSE CODE: M 3013 **APPLICATION OF ADVANCED VISUAL FUNCTIONS** **CREDIT HOURS: (01-0.5) 1.5**

Objective

By the end of this module, students should be able to:

- Understand visual functions and the use of different charts in different age groups
- Measure Visual functions accurately.
- Analyze the results in order to proceed with further investigative procedures based on the results of the tests performed
- Manage refractive errors, visual field defects, glare, contrast sensitivity, color vision anomalies.
- Diagnose measure and manage binocular single vision defects.

Course Contents

1. **Ocular motility and dysfunctions**
    - Disorders of ocular motility
2. **Principals of Visual functions**
    - visual acuity, visual fields , color vision ,contrast sensitivity, glare sensitivity - Definitions, principal, different charts used/ instruments used to measure these visual functions.
3. **Refractive errors**
    - Types of refractive errors- Myopia, Hyperopia, Astigmatism, Presbyopia
    - Diagnosis and management of Refractive errors
4. **Binocular Single Vision assessment**
    - Binocular Single Vision –Grades of BSV, tests performed to measure different grades of BSV, assessment and management of BSV.
5. **Heterophoria**
    - Definition, types, diagnosis & measurement of of different types of Heterophoria.

RECOMMENDED BOOKS

- Clinical Optics(Third Edition) by Andre R. Elkington, Helena J. Frank, Michael J. Greany
- Theory and practice of optics and refraction by AK Khurana
- Clinical Orthoptics by Fiona Rowe
- Clinical Ophthalmology by jaypee

COURSE CODE: M 3014 **ADVANCE DISEASES OF EYE & THEIR MANAGEMENT** **CREDIT HOURS: (2.5-1.5) 04**

Objective

This course will enable students

- To be familiar with basic pathological factors involving the ocular tissue.
- To be familiar with pathological feature of all the ocular disease peading to morbidities.
- To be able to screen out the most common blinding disease like cataracts, glaucoma diabetic retinopathy.
- To understand basic ophthalmic workup.
- To identify a pathological condition & to understand pathophysiology of disease.

Course Contents

1. **Orbit**
    - Proptosis
    - Preseptal cellulitis
    - Orbital cellulitis
    - Thyroid eye disease

2. **Eye lids**
    - Chalazion
    - Hordeolum externum
    - Hordeolum internum
    - Blepharitis
    - Trichiasis
    - Entropion
    - Ectropion
    - Ptosis
    - Tumors of eyelids

3. **Lacrimal system**
    - Acute dacryoadenitis
    - Chronis dacryoadenitis
    - Kerato conjunctivitis sicca
    - Lacrimation

- Congenital Nasolacrimal duct obstruction
- Acute dacryocystitis
- Chronic dacryocystitis
- Epiphora

4. Conjunctiva

- Bacterial conjunctivitis
- Viral conjunctivitis
- Chlamydial conjunctivitis
- Ophthalmia neonatorum
- Acute allergic rhinoconjunctivitis
- Vernal keratoconjunctivitis
- Atopic keratoconjunctivitis
- Phlyctenular keratoconjunctivitis
- Pterygium
- Pinguecula
- Xerophthalmia

5. Sclera

- Episcleritis
- Scleritis

6. Cornea

- Bacterial corneal ulcer
- Fungal keratitis
- Acanthamoeba keratitis
- Herpes simplex keratitis
- Herpes zoster ophthalmicus
- Mooren’s ulcer
- Keratoconus
- Filamentary keratitis
- Corneal degenerations
- Corneal dystrophies
- Keratoplasty

7. Lens

- Congenital cataract
- Developmental cataract
- Age related cataract

8. Pupil

- Abnormalities of pupillary light reflex
- Coloboma of iris
- Anisocoria
- Miosis
- Mydriatic
- Correctopia
- Polycoria

9. Uveal Tract

- Iridocyclitis
- Uveitis
- Endophthalmitis
- Panophthalmitis
- Sympathetic ophthalmitis

10. Retina

- Diabetic retinopathy
- Hypertensive retinopathy
- Toxemia of pregnancy
- Retinal vein occlusion
- Retinal artery occlusion
- Retinopathy of prematurity
- Age related macular degeneration
- Retinal detachment
- Retinitis pigmentosa
- Retinoblastoma

11. Optic Nerve

- Optic disc edema
- Optic neuritis
- Papilloedema
- Optic atrophy

12. Extra ocular Muscles

- Nerve palsies of EOM

13. Cranial Nerves (3rd, 4th, 5th, 6th, 7th)

- Nerve palsies

14. Visual Pathways

- Lesions of visual pathways

15. Glaucoma

- POAG
- PACG
- Secondary Glaucoma
- Congenital Glaucoma

RECOMMENDED BOOKS

- Shafi M. Jatoi : 6th edition
- Kanski : 9th Edition
- Clinical Anatomy of the Eye(Snell's): 22nd Edition

COURSE CONTENT OF FOURTH PROFESSIONAL YEAR (Optometry)

COURSE CODE: M 4101 **REVIEW OF BASICS OF VISION AND OPTICS** **CREDIT HOURS: (1.5-2.5) 04**

Objectives

This course will enable students to

- Understand principal and types of Retinoscopy
- Indications and contraindications of Cycloplegic refraction
- Procedure to perform dry and wet Retinoscopy
- Perform refraction & different post refraction tests
- Diagnose measure and manage binocular single vision defects and refractive errors
- Manage refractive errors, visual field defects, glare, contrast sensitivity, color vision anomalies.
- Analyze treatment options to manage refractive errors, optical (spectacle and contact lenses), refractive surgery.

Course Contents

1. **Review of Retinosopy**
   - History
   - Types & procedure to perform retinoscopy
   - Cycloplegic Refraction

2. **Refractive errors**
   - Types of refractive errors- Myopia, Hyperopia, Astigmatism, Presbyopia,
   - Diagnosis and management of Refractive errors

3. **Post Refraction tests and use of associated instruments/Equipment**
   - Auto-refraction
   - Determination of cylinder axis and power -Cross cylinder technique,Duo chrome test
   - Binocular Balancing/IPD/BVD
   - Determination of Near ADD
   - Focimetry
   - Keratometry
   - Auto Refraction
   - Use of Phoropter
   - Cutting the cylinder and the spherical equivalent
   - Transposition while prescribing (plus toric vs. minus toric)

4. Binocular Single Vision assessment

- Binocular Single Vision –Grades of BSV, tests performed to measure different grades of BSV, assessment and management of BSV.

5. Strabismus

- Definition, types, diagnosis & measurement of of different types of Heterophoria and Heterotropia.

6. Options for correcting refractive errors

- Glasses (spectacle)
- Far point correction
- Effect of accommodation (NPA, NPC)
- Partial vs. full correction
- Contact lens (hard contact lens, soft contact lens, etc)
    - Types: Toric, disposable, extended wear
    - Lens fitting
    - Patient selection
    - Complications
    - Refractive surgery-RK, PRK , LASIK, PHEMTO LASIK, CLE
    - Preoperative evaluation: keratometry, pachymetry, topography
    - Procedures
    - Complications

7. Special consideration for correction

- Refraction after cataract surgery pseudophakia,
- aphakia,
- Anisometropia,
- high myopia
- high hyperopia
- Prescribing in children

RECOMMENDED BOOKS

- Clinical Optics(Third Edition) by Andre R. Elkington, Helena J. Frank, Michael J. Greany
- Theory and practice of optics and refraction by AK Khurana
- Clinical Orthoptics by Fiona Rowe
- Clinical Ophthalmology by Jaypee
- Clinical Procedures in primary eye care by David B. Elliot
- Clinical Ophthalmology by Jack J. Kanski

COURSE CODE: M 4102 VISUAL SCIENCES 1, 2, 3 & 4 CREDIT HOURS: (2.5-2.5) 05

Objectives

This course will enable students

- To acquaint the student with the anatomy/physiology of the human central nervous system as it relates to the sensation of vision
- To provides the detail of the function of the eyes & their neuronal control
- To develop awareness for principles of measurements in particular the principles behind recording electrophysiological signals from the visual system
- To understand the neuronal development of binocular single vision and its physiological concepts
- To develop an awareness of the clinical characteristics of refraction, errors and their effects on vision and its clinical evaluation
- To understand various aspects of vision from neurophysiology

Course Content

1. **Basic Neuroscience:**
    - Introduction
    - Review of anatomy of brain
    - Vascular & venous drainage

2. **Afferent systems:**
    - Cranial Nerves
    - Ocular Embryology in relation to general development

3. **Macroanatomy:**
    - Neurosensory organs of eyeball
    - Retina, fovea, macula, choroid

4. **Retinal Microanaotomy & Function:**
    - RPE, Photoreceptors & inner limiting membrane
    - RPE & photoreceptor, phototransduction
    - Retinal histology, circuit, receptive field
    - Optic chiasma, thalamic structures
    - Optic radiations and visual fields
    - Primary visual cortex, integration
    - Binocular vision
    - Associative cortices

5. **Visual system Neurophysiology:**
    - Retinal out put
    - Sub cortical structures
    - Pupil pathway

6. **Efferent Systems**
    - Nuclear pathways
    - Inter-nuclear Pathways
    - Supranuclear Pathways
    - Infranuclear pathways

7. **Clinical use of Keratometry in refraction**

COURSE CODE: M 4103 **BINOCULAR VISION & ITS CLINICAL APPLICATION** **CREDIT HOURS: (02-02) 04**

Objectives

This course deal with the definition of low vision, epidemiological aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive optical, non-optical and electronic devices for visually challenged people, art of prescribing low vision devices and training the low vision clients along with other rehabilitation measures.

At the end of this course students will be able to;

- Describe Low Vision and epidemiology of Low Vision.
- Perform Clinical examination of Low vision subjects.
- Prescribe Optical, Non-Optical, Electronic, and Assistive devices.
- Provide training to Low Vision subjects with Low vision devices.

Course Contents

1. **Introduction to Low vision, basic terminology**
    - Describe WHO definition of LV.
    - Comprehend Classification of LV.
2. **Epidemiology of low vision,**
    - Model of low vision service
    - Describe prevalence of LV.
    - Describe Epidemiology and low vision services at different levels.

3. **Pre-clinical evaluation of low vision patients.**
    - Perform pre-clinical evaluation procedure of LV clients.
    - Assess causes and symptoms of LV clients.
4. **Prognostic & psychological factors; psycho-social impact of low vision**
    - Enlist Psycho – social impacts of LV.
    - Enlist educational and functional impacts of LV.

5. **Types of low vision aids – optical aids, non-optical aids & electronic devices**
    - Describe Types of LV aids.
    - Illustration of LV aids.

6. **Practice of optical aids, non-optical aids & electronic devices**
    - Justify the Use of different devices.
    - Disadvantages and contraindications of devices.

7. **Optics of low vision aids**
    - Define Optical properties of LVD's.
    - Demonstrate Optical properties of LVD's.

8. **Group discussion**
    - Draw optics of different LVD's.
    - Illustrate optics of different LVD's.

9. **Clinical Assessment of Low Vision clients.**
    - History taking and review of medical response.
    - Assess VA, PHVA, Refracction.
    - Describe assessment methods of colour vision, contrast sensitivity, glare sensitivity and visual field.
    - Additional tests (Cover/Uncover, Ophthalmoscopy)
    - Magnification (types of magnification, methods to calculate magnification, magnification of different types of low vision devices.

10. **Selection of low vision aids, instruction & training.**
    - Select different LVD for different subjects
    - Training of different subjects on different LVD,s.

11. **Pediatric Low Vision care**
    - Determine needs of children with low vision
    - Training of children on LVD,s as per needs

12. **Low vision aids – dispensing & prescribing aspects**
    - Describe dispensing methods of LVD,s
    - Dispensing procedures.
    - Dispensing for children
    - Perform Need base dispensing in children

13. Visual rehabilitation & counseling

- Compare Rehabilitation techniques
- Counseling methods

14. Legal aspects of Low vision in Pakistan and internationally

- Define National and international Laws for partially sighted.
- Enlist National and international law for partially sighted.

15. Understanding the Psychology of low vision subjects.

- Understand the Psychology of LV subjects
- Illustrate psychological needs of LV subjects.
- Low Vision Counseling in school going children
- Perform Low Vision Counseling in school going children
- Describe needs of school going children

RECOMMENDED BOOKS

- Low Vision Principles and Practice Low vision care, 4th edition by Christine Dickinson (1998)
- Practice of Low vision – A guide book by E Vaithilingam (2012)
- Brien Holden Vision Institute- student manual by Hasan Minto, P Bashyarangan, R P Ghoshal Meera, Deepak Kumar
- Understanding Low vision by Jose RT (1983)

COURSE CODE: M 4104 CLINICAL OPTOMETRY CREDIT HOURS: (02-02) 04

Objectives

After this module students will be able to

- Know how to do refraction / retinoscopy in different scenarios
- Use of cross cylinder and its significance in refraction
- Use of direct ophthalmoscopy and how to do direct ophthalmoscopy
- Convergence and its abnormalities and their significance in refraction
- Accommodation and its significance in refraction

Course Contents

- Preliminary clinical evaluation
- Retinoscopy
- Retinoscopy in astigmatism
- Dynamic retinoscopy variation of dynamic retinoscopy
- Retinoscopy
- Retinoscopy in astigmatism
- Dynamic retinoscopy variation of dynamic retinoscopy
- Subjective refraction,Principal and methods – fogging technique
- Jacksons crossed cylinder, Monocular refractive end points + 1 blur
- Duochrome tests ,Binocular equalizing method
- Binocular subjective refraction, Near subjective refraction
- Convergence and anomalies of convergence
- Accommodation and anomalies of accommodation
- Accommodation and presbyopia, Confortable near vision
- The amplitude of accommodation ,Effect of age
- Crossed cylinder test of accommodation
- Determination of presbyopic addition
- Direct Ophthalmoscopy
- Optics and uses
- Direct Ophthalmoscopy
- Optics and uses
- Biomicroscopy
- Indirect Ophthalmoscopy
- Optics and uses
- Indirect Ophthalmoscopy
- Optics and uses
- Visual field and visual field tests

- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Photo documentation
- Methods of ocular photography- anterior eye and fundus
- Photo documentation
- Methods of ocular photography- anterior eye and fundus
- Photo documentation
- Methods of ocular photography- anterior eye and fundus

RECOMMENDED BOOKS

- Shafi jatoi
- Parsons fundamentals of eye
- Kanski clinical ophthalmology

COURSE CODE: M 4105 DISPENSING OPTICS CREDIT HOURS: (02-03) 05

Objectives

This course will enable students to;

- To enable the students to have adequate knowledge about ophthalmic dispensing and the use of glasses in different environmental and eye conditions.
- Reading of spectacle prescription
- Counseling the patient
- Lens edge thickness calculation
- Frame & lens measurements and selection
- Writing spectacle lens order
- Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
- Lens verification and axis marking and fitting of all lens types
- Final checking of finished spectacle with frame adjustments
- Delivery and follow-up
- Troubleshooting complaints and handling patient's questions.

Course Contents

Corneal Anatomy & Physiology WRT Contact Lenses

1. **Ophthalmic dispensing**

Types of ophthalmic lenses According to:

- Correction
- Form
- Work

Types of ophthalmic lenses According to:

- Materials
- Coatings

2. **Characteristics of ophthalmic lenses**

- Spherical lenses forms
- Spherical equivalent
- Cylindrical lenses forms
- Cylindrical reduction

3. **Optical considerations**
   Effect of vertex distance on increasing lens power

4. **Optical prism**
   Centration and Decentration

5. **Dispensing prism**
   Decentration of spheres

6. **Dispensing prism**
   Decent ration of cylinders

7. **Spectacle Frames**
   Frames types
   Frame parts

8. **Spectacle Frames**
   Frame materials

9. **Frames Material**
   Allergic reactions to frame materials

10. **Spectacle Lenses**
    Lens types
    Lens Shapes

11. **Spectacle Lenses**
    Lens Forms
    Lens Materials

12. **Verification of Spectacles**
    Lens power and axis
    Neutralization procedure

13. **Verification of Spectacles**
    Neutralization procedure

14. Lens and frame dimension

Boxing system

15. Blank size

Definition

Formula for determining blank size

16. Measuring IPD

Definition of IPD

Near pupillary distance

17. Measuring IPD

Distance pupillary distance

18. Dispensing

Revision of dispensing

19. Ophthalmic dispensing

Revision of spectacles

Lens & Frame markings, pupillary centers, bifocal heights, Progressive markings & adjustments – facial wrap, pantoscopic tilt

20. Lens fitting

Edging, glazing,lying

21. Reference point placement

Major reference point (MRP)

Face form

22. Reference point placement

Vertical displacement

Pantoscopic tilt

23. Measurement of Multifocal segment height

Bifocal segment height

Trifocal segment height

24. Measurement of Multifocal segment height

Progressive lenses

MRP height

25. Frame selection

Frame selection by: face

26. Frame selection

Frame selection by: color: Bridge selection

27. Frame fitting consideration

For children

Older wearer

Safety eye ware

Good and Bad fitting

28. Aniseikonia

Definition

Types

Symptoms

Magnification

29. Aniseikonia

Correcting Aniseikonia with spectacles lenses

30. Aniseikonia

Methods for correcting Aniseikonia

31. Focimeter

Principle

Parts

Optics

Uses of focimeter

RECOMMENDED BOOKS

- Theory and practice of optics and refraction Financial Management by A K Khaurana
- Systems for Ophthalmic Dispensing by C. W, Borish

COURSE CODE: M 4106 CONTACT LENSES CREDIT HOURS: (2.5-2.5) 05

Objectives

This course will enable students to

- Describe and manage contact lens related complications
- Explain the management of contact lens related complications
- Explain the management of presbyopic patients using contact lenses
- Describe management of patients with special eye-care needs
- Fit specialty contact lenses to patients.

Course Contents

1. **Corneal Anatomy & Physiology WRT Contact Lenses**
2. **Patient selection**
    - History Taking with respect to contact lenses
    - Examination of the Anterior Segment The Routine Preliminary Examination
    - Introduction to Contact Lens Fitting
    - Corneal Topography: Measurement and Significance
3. **Contact lens materials**
    - Contact Lens Materials
    - Selection of lenses-Options available
    - Indications and contraindications of contact lenses
4. **Corneal lenses optics & Manufacturing techniques**
    - The Optics of Contact Lenses
    - Soft Contact Lens Design
    - Rigid Gas Permeable Contact Lens Design
5. **Corneal lenses – fitting philosophies**
    - Fitting Spherical Rigid Gas Permeable Contact Lenses
    - The Effects of RGP Parameter Changes on Lens Fitting
    - Fitting Spherical Soft Contact Lenses
6. **Considerations in contact lens wear**
    - Options for Wear Modality and Lens Replacement
    - Microbiology and Contact Lens Wear
    - Ocular Host Defence Systems and Contact Lens Wear

7. Lens care solutions and their use

- Contact Lens Care and Maintenance
- Contact Lens Contamination and Lens Deposits
- Contact Lens Care Products: Properties and Performance
- Care and Maintenance of GP Contact Lens
- Care and Maintenance of Hydrogel and SiHy Contact Lenses

8. Contact lens aftercare procedures-Teaching the patient to use contact lenses

- Lens Dispensing and Patient Education
- Conducting the After-Care Visit
- Slit-Lamp Examination of the Contact Lens Patient

9. contact lenses for special purposes

- Contact Lenses and Sport
- The Working Environment and Contact Lenses

10. Astigmatism and rigid lens toric designs

- Astigmatism
- Toric Rigid Gas Permeable Contact Lens Types and Designs
- Fitting Toric RGP Contact Lenses

11. Soft lens toric designs

- Toric Soft Contact Lenses
- Fitting Toric Soft Contact Lenses

12. Advanced techniques and instrumentation

- Introduction to Advanced Techniques and Instrumentation

13. Specialty contact lens fitting

- Keratoconus and Contact Lenses
- Presbyopia and Contact Lenses
- Children and Contact Lenses
- Aphakia and Contact Lenses
- Refractive Surgery and Contact Lenses
- Therapeutic Contact Lenses
- Tinted Contact Lenses
- Orthokeratology
- Scleral Lenses
- Fitting an Ocular Prosthesis

14. Contact lens wear complications and management

- Patient Symptoms and Clinical Signs
- SCL Complications and Their Management
- RGPCL Complications and Their Management
- Diagnosis and Management of Dry Eye in Contact Lens Wear

RECOMMENDED BOOKS

- International Association of Contact Lens Educators (IACLE) Course Materials. Available at: http://iacle.org/joomla/index.php/73-free-resources/free-resources/262-download-the-iacle-contact-lens-course
- Bennett ES, Weissman BA. Clinical Contact Lens Practice, Lippincott Williams & Wilkins
- Bennett ES, Henry VA, Clinical manual of contact lenses, Philadelphia, Pa. Wolters Kluwer Health/Lippincott Williams & Wilkins 2013. .
- Franklin A, Franklin N. Eye Essentials: Rigid gas-Permeable Lens Fitting, Butterworth-Heinemann; 2006.
- Efron N. Contact Lens Practice. Butterworth-Heinemann; 2010.
- Douthwaite, W.A. Contact Lens Optics and Lens design. Butterworth-Heinemann; 2006
- International Association of Contact Lens Educators (IACLE) Course Materials. Available to IACLE Members at: http://iacle.org/joomla/index.php/73-free-resources/free-resources/262-download-the-iacle-contact-lenscourse
- Efron N. The Cornea: its examination in contact lens practice. Butterworth-Heinemann. 2001.
- Bennett ES and Hom MM. Manual of Gas Permeable Contact Lenses. 2nd Edition. ButterworthHeinemann/Elsevier Science. 2004.
- Scheid TR. Clinical Manual of Specialized Contact Lens Prescribing. Butterworth-Heinemann. 2002.
- Efron N. Contact Lens Practice. Butterworth-Heinemann; 2010
- DeMilton Hom, Manual Of Contact Lens Prescribing And Fitting
- IACLE Integrated Education Program Materials
- Gasson A, Morris JA. The Contact Lens Manual: A Practical Guide to Fitting; Butterworth-Heinemann; 2010.
- Phillips AJ, Speedwell L. Contact Lenses, Edinburgh ; Butterworth-Heinemann; 2007
- Franklin A, Franklin N. Eye Essentials: Soft Lens Fitting, Butterworth-Heinemann; 2006.
- DeMilton Hom, Manual of Contact Lens Prescribing and Fitting
- Bennett, ES, Hom, MM. Manual of Gas Permeable Contact Lenses, 2/e, Butterworth-Heinemann/Elsevier Science, 2004

COURSE CODE: M 4107 APPLIED STATISTICS CREDIT HOURS: (01-04) 05
RESEARCH METHODOLOGY & PROJECT

Objectives

This course will enable students to;

- Develop an understanding of relationship between epidemiology, biostatistics and research methodology.
- Understand and learn the basic concepts and introduction of research methodology at undergraduate student level as it applies to vision sciences, in particular the principles of basic epidemiology, epidemiological study designs, data collection, assimilation and analysis (applied biostatistics).
- Learn the use of a common software for research (Statistical Package for Social Sciences or SPSS, latest version)

Course Contents

- Review of basic epidemiology
- Epidemiological studies
    - Descriptive
    - Analytical
    - Experimental
- Research Methodology
    - Synopsis writing
    - Research Question
    - Literature Review
    - Formulation of objectives and selecting a suitable study design
    - Collection and cleaning of data
    - Data analysis
    - Writing Results
    - Report (Dissertation & Article) writing
    - Discussion
    - Referencing
- Basic and Applied Biostatistics
    - Review of basic biostatistics
    - Choosing and using appropriate statistical tools
    - Hypothesis testing
    - Tests of significance
    - Interpretation of results

PRACTICAL

- Selection of appropriate population and sample
- Development of data collection tool
- Data Collection, cleaning and entry on computer using SPSS
- Data Analysis
- Dissertation writing
- Article writing

COURSE CODE: M 4109 **ADVANCED INCLUSIVE EYE HEALTH** **CREDIT HOURS: (1.5-0.5) 02**

Objectives

This course will enable students to

- Understand the epidemiology of disability and its implications for health professionals
- Understand community based inclusive development
- Understand the role of inclusive approach in screening programs and during eye health intervention in emergencies and disasters
- Understand the role of assistive/adaptive technology in promoting inclusion

Course Contents

1 Refresher of the Intermediate Module

- UNCRPD and SDGs – concepts and principles for health professionals
- DPOs and rehabilitation services – their relationship to inclusive eye health
- Universal Design – recalling what we mean by it

2 Epidemiology of Disability

- Epidemiology of Disability in Pakistan
- Understanding the difference between 'Disabled Persons' and 'Disabilities'
- Introduce use of terms Disability Adjusted Life Years, Quality Adjusted Life Years, Years of Life Lost to Disability
- Estimating the need of services for Persons with Disabilities using a district model

3 Children with blindness and other disabilities

- What is childhood blindness and how can we estimate its magnitude and need for services using a district model
- Why is it important
- What implications does this have for clinical practice
- How can clinical services, including Low Vision services, engage and interface with other sectors like education and social services to address childhood blindness
- How one can practice the principles of inclusion when approaching children with disability (especially small children)

4 Community Based Inclusive Development

- What is CBID – what is the difference with CBR
- How is CBID provided in Pakistan and by whom
- How can clinical services and health professionals interface with CBID programs
- What role can clinical services play in supporting CBID

5 Communication

- Recalling Essential Pakistan Sign Language Vocabulary for Clinicians and Health Professionals
- Recalling Confidence in communicating with people with all types of impairments and from other language groups

6 Screening programs

- How can we make an eye health screening programs inclusive
- Guidelines for screening camps

7 Emergencies and Disasters

- What do you understand by emergencies and disasters
- What sort of emergencies and disasters has Pakistan faced in the last 15 years
- What groups of people in disaster affected areas are likely to be the most vulnerable and why – emphasize women, children and persons who are aged, those with disabilities, or otherwise socially excluded
- If you were asked to set up eye health services in emergency situations, how would you incorporate the principles and concepts of inclusive eye health, recalling all you have learnt so far

8 Assistive / Adaptive Technology

- Orientation on assistive/adaptive technology for clients of low vision, hearing and mobility impairment

RECOMMENDED BOOKS / ARTICLES

- INCLUSION MADE EASY © CBM A quick program guide to disability in development Link to book; https://www.cbm.org/fileadmin/user_upload/Publications/cbm_inclusion_made_easy_a_quick guide_to_disability_in_development.pdf
- INCLUSION MADE EASY IN EYE HEALTH PROGRAMS Disability inclusive practices for strengthening comprehensive eye care
- https://www.cbm.org/fileadmin/user_upload/Publications/CBM-DID-TOOLKIT-accessible.pdf
- Disability as Diversity, A Guidebook for Inclusion in Medicine, Nursing, and the Health Professions, Editors: Meeks, Lisa M., Neal-Boylan, Leslie (Eds.)
- Inclusive Health Promotion: Public Health Remedy for People with Disabilities Paperback – by Rebecca Mabaso
- Inclusive Practice for Health Professionals 1st Edition by Jenny Davis, Melanie Birks, Ysanne Chapman

COURSE CONTENT OF FOURTH PROFESSIONAL YEAR (Orthoptics)

COURSE CODE: M 4201 **REVIEW OF BASICS OF VISION & OPTICS** **CREDIT HOURS: (01-03) 04**

Objectives

This course will enable students

- To understand the molecular mechanism involved in genome organization and expression
- To Understand the molecular basis of disease and disease transfer
- To understand the role of recombinant DNA technology in medicine
- Explain the processes of replication, transcription, and translation, and relate to biotechnology.
- Compare and contrast nuclear replication mechanisms for prokaryotic, eukaryotic, and viral pathogens.
- Describe and evaluate types of target sequences (DNA, mRNA, tRNA, and rRNA) used in clinical laboratory testing
- To develop the skill in basic molecular biology techniques

Course Contents

1. **Introduction to molecular biology**
    - Historical elucidation of DNA structure
    - Physical and chemical properties of nucleic acids
    - Structure of DNA and concept of nucleotides, nucleosides, nucleosomes, nitrogenous bases
    - DNA as heritable material

2. **DNA replication and packaging**
    - Semiconservative replication
    - Enzymes involved in replication
    - Origin of replication
    - replication Mechanism
    - Fundamental differences in replication of prokaryotic and eukaryotic genomes

3. **Chromosomal organization**
    - Packaging of DNA in chromatin
    - Regulation of chromatin
    - Organization of human genome on chromosome

4. Gene expression

- From DNA to RNA: the structure and function of the gene, promoters and terminators. Transcriptional initiation, elongation and termination, RNA polymerases
- Structure, function and biochemical properties of RNA
- From RNA to Protein: the genetic code, codons & anticodons, the ribosome & translation
- Gene expression in prokaryotes: the Lac operon
- Gene expression in eukaryotes: regulation of transcription, promoters, enhancer elements; RNA splicing, post-transcriptional and post-translational regulation

5. Molecular basis of mutation

- Causes of mutations: replication errors, mutagens
- Repair of mutations: direct repair of damaged nucleotides, repair by excision and DNA re-synthesis
- Effects of mutations on the information content of a gene, examples of mutations that result in human genetic disease
- Effects of mutations on organisms: genotype and phenotype, sex-linked mutations, chromosome abnormalities

6. Mechanisms of genetic transfer

- Structure and function of transposons and plasmid
- Mechanism of horizontal gene transfer (conjugation, transformation, transduction and recombination)

7. Recombinant DNA Technology

- Historical context of cloning
- Restriction enzymes and restriction digestion
- Cloning vectors and recombinant DNA creation
- Insertion of recombinant DNA in cloning vector and its expression
- Application of recombinant DNA technology in medical

8. Genome sequencing

- History of DNA sequencing
- Application
- Sanger dideoxy sequencing
- Maxam-Gilbert sequencing
- Next generation sequencing (NGS) techniques

PRACTICALS

1. **Genome extraction**
    - DNA extraction from various samples (Blood, tissue, semen etc.)
    - Manual and column based extraction techniques

2. **DNA detection and quantification**
    - Agarose gel electrophoresis for the detection of DNA
    - Spectrophotometric (Nano-drop) technique for quantification of DNA

3. **Primer designing**
    - Primer designing tools
    - Analysis of primers for optimization
    - Designing of product specific and universal primers

4. **Polymerase chain reaction (PCR)**
    - Principle, types, equipment and reagent requirement
    - Performance and interpretation of conventional and real time PCR for various diseases

RECOMMENDED BOOKS

- See at the end of the Orthoptics Curriculum.

COURSE CODE: M 4202 VISUAL SCIENCES 1, 2, 3 & 4 CREDIT HOURS: (02-03) 05

Objectives

This course will enable students

- To acquaint the student with the anatomy/physiology of the human central nervous system as it relates to the sensation of vision
- To provides the detail of the function of the eyes & their neuronal control
- To develop awareness for principles of measurements in particular the principles behind recording electrophysiological signals from the visual system
- To understand the neuronal development of binocular single vision and its physiological concepts
- To develop an awareness of the clinical characteristics of refraction, errors and their effects on vision and its clinical evaluation
- To understand various aspects of vision from neurophysiology

Course Content

8. Basic Neuroscience:

- Introduction
- Review of anatomy of brain
- Vascular & venous drainage

9. Afferent systems:

- Cranial Nerves
- Ocular Embryology in relation to general development

10. Macroanatomy:

- Neurosensory organs of eyeball
- Retina, fovea, macula, choroid

11. Retinal Microanaotomy & Function:

- RPE, Photoreceptors & inner limiting membrane
- RPE & photoreceptor, phototransduction
- Retinal histology, circuit, receptive field
- Optic chiasma, thalamic structures
- Optic radiations and visual fields
- Primary visual cortex, integration
- Binocular vision
- Associative cortices

12. Visual system Neurophysiology:

- Retinal out put
- Sub cortical structures
- Pupil pathway

13. Efferent Systems

- Nuclear pathways
- Inter-nuclear Pathways
- Supranuclear Pathways
- Infranuclear pathways

14. Clinical use of Keratometry in refraction

RECOMMENDED BOOKS

See at the end of the Orthoptics Curriculum.

COURSE CODE: M 4203 CLINICAL ORTHOPTICS CREDIT HOURS: (03-02) 05

Objectives

This course will enable students

- To provide knowledge on advanced ophthalmic diagnostic techniques and preliminary data analysis used to detect ophthalmic disorders.
- To develop clinical testing techniques to assess ocular alignment, binocular vision and ocular motility through variety of clinical investigations, ocular and systemic
- To develop awareness of developmental visual disorders and its management to deal skillfully with pediatric population with visual problems
- To develop systematic approach to instrumentation selection and performance, and will equip students with the ability to recognize and solve inconsistencies in results occurring due to instrumentation, examiner or patient errors.

Course Contents

1. **The preliminary examination**
    - The goals of performing preliminary tests
    - History taking
    - Habitual VA and its significance
    - The Hischberg test and angle kappa test
    - The theory and methods of the unilateral and alternate cover tests
    - Prism cover tests

2. **Assessments of binocular motility**
    - The near point of convergence and other evaluation
    - The near point of accommodation
    - The evaluation of ocular dominance
    - The evaluation of normal and abnormal pupil responses and iris colour

3. **Visual field assessment**
    - Investigation of confrontation visual fields
    - Field of BSV
    - Screening for central field

4. **Assessment of visual acuity and its advance clinical implications**
    - Assessment of visual acuity
    - Concepts of aided and unaided acuity
    - Comparisons between various systems of recording visual acuity
    - Clinical methods of measurement
    - Relationships between refractive error and acuity
    - Effect of Amblyopia and other abnormal eye condition on vision

5. **Retinoscopy**
    - Spot and streak Retinoscopy – static methods
    - Retinoscopy in astigmatism
    - Near point Retinoscopy
    - Dynamic methods
    - Variations of dynamic Retinoscopy
    - Application of these results will be discussed

6. **The auxiliary refractive techniques**
    - Principles
    - Methods and applications of auto-refraction
    - Photo refraction
    - Laser refraction

7. **Subjective refraction**
    - Monocular subjective refraction
    - Principles and methods – fogging techniques
    - Fan and block techniques
    - Jackson’s crossed cylinder
    - Monocular refractive endpoints -+1.00D blur
    - Duochrome tests
    - Binocular equalization methods – infinity balance
    - Prismatic techniques
    - Binocular subjective refraction
    - Near subjective refraction

8. **Screen tests (Hess/ Lee Screen)**
9. **Eye Movement Recording**

10. Ptosis & Proptosis Evaluation

- Ptosis measurements
- Exophthalmometry

11. Assessment of pupils

12. Neuroimaging

- X- ray
- CT
- MRI

13. Evaluation of torsion

14. Synoptophore

15. Prism adaptation test

- Vergence adaptation
- Slow vergence
- Fast vergence
- Clinical implication

16. Investigations of binocularity

- Brief review the theories and principles of binocular visual function
- Heterophoria tests- principles and methods
- The accommodation convergence relationship- the AC/A and CA/C ratios
- Assessment of fusional vergences – methods and normal findings
- The vergence - facility test
- Stereopsis – measurement and clinical application
- The identification of binocular anomalies – nomenclature
- Analysis of binocular status

17. Accommodation and Presbyopia

- Comfortable near vision
- The amplitude of accommodation – methods of measurement
- Effect of age
- Crossed – cylinder tests of accommodation
- Relative ranges of accommodation
- Accommodative facility test
- Determination of the presbyopic addition

18. Adjunctive clinical procedures

- Direct Ophthalmoscopy
- Indirect ophthalmoscopy
- Slit lamp Biomicroscopy
- IOP and tonometry

19. Advance visual function assessment

- Visual field and the visual field tests
- Macular functions
- Colour vision & contrast Sensitivity
- Sphagomanometry & Cardio Pulmonary Resuscitation (CPR)
- Diagnostic ophthalmic medications
- Photodocumentation

PAEDIATRIC PRACTICE IN ORTHOPTICS

20. Visual development

- Development of retinal elements
- Development of visual pathways
- The maturation of ocular motility and its neuroanatomic elements
- Development of the cortical connections of visual cortex

21. The development of binocular vision

- Development of fusion and stereopsis
- Development of binocular motion processing
- Binocular vs. monocular VA in infants & children
- Development of Vergence and binocular ocular alignment
- Neural mechanism of normal binocular development

CLINICAL EXAMINATION OF CHILDREN

Building a rapport with children - Special considerations

22. Techniques for the assessment of following in children

- VA
- Contrast sensitivity
- Binocular vision
- Visual fields
- Colour vision
- Ocular movements
- Paediatric VEP, ERG, EOG testing

23. Management of visual problems in children

- Refractive correction in the absence of Strabismus
- Contact lens correction in children
- Refractive correction with Strabismus
    - Infantile Strabismus
    - Acquired Esotropia
    - Acquired Exotropia
    - Convergence insufficiency
    - Amblyopia therapy
- Reading difficulties
    - Refractive correction
    - Ocular exercises
- Accommodation anomalies
- Shaken baby syndrome
- Dyslexia

24. Practical tips in clinical Paediatric Orthoptic practice

- Involvement of the child and the parents
- Helping the parents to remember the given information/instructions
- Helping the child and the parents to comply with treatment
- Tactful acceptable way of breaking the bad news in the course of therapy
- Co-operation/ collaboration with other involved professionals like Paediatric Ophthalmologist, physician and teachers
- Providing written information to parents and other professionals

25. Low vision in children and its management

- Definitions
- Examination of the low vision patient
- Optical aspects of low vision aids
- low vision- management
- Prescription techniques
- Of low vision aids
- Management of low vision patients
- Low vision services in Pakistan

RECOMMENDED BOOKS

See at the end of the Orthoptics Curriculum.

COURSE CODE: M 4204 **BINOCULAR VISION & ITS CLINICAL APPLICATION** **CREDIT HOURS: (03-02) 05**

Objectives

This course will enable students

- To develop an understanding of the causes, mechanisms and disease processes in particular focusing on eye conditions
- To develop orthoptic concepts of binocular single vision, strabismus and ocular motility defects
- To deepen the understanding of binocular single vision, strabismus and ocular motility defects
- To develop knowledge of investigation, diagnosis and management
- To consolidate application of theoretical knowledge to clinical situations and to improve clinical skills in all aspects of orthoptic work

Course Contents

1. **Introduction to the normal adult psychophysics**
2. **Binocular correspondence**
3. **The geometric horopter, horizontal disparity and the longitudinal horopter**
4. **Fusion, diplopia & the Panum's fusion area**
    - Stereopsis
        - Disparity sensitivity
        - Range of stereopsis, fusion and depth perception
    - Static and dynamic stereopsis,
        - Neuroanatomic basis
        - Properties
5. **Static and dynamic stereoacuity vs. visual acuity**
6. **Monocular depth perception**
7. **Binocular correlation sensitivity, and the concept of rivalry and suppression**
8. **Variation in human stereopsis and vergence**
9. **Vision therapy concepts**
10. **Vision therapy procedures and instrumentations; Synotophore, stereoscopes, physiological diplopia techniques and their application**
11. **Diplopia, Confusion, suppression**

12. Heterophoria and its management

- Aetiology and classifications
- Clinical signs and symptomotology
- Compensation and decompensation
- Factors affecting compensations
- Investigations
- Fixation disparity
- Management of heterophorias – effects of refractive correction

13. Visual therapy and prismatic therapy

- Prognosis

14. Accommodation and convergence anomalies

- Accommodation and convergence excess and insufficiency
- Investigations and management

15. Heterotropia

- Aetiology and classification; Comitance and incomitance

16. Esodevitations

- Types; Congenital,
- Strabismus convergence acutus
- Clinical presentation,
- Investigations,
- Management

17. Exodeviations

- Types; Constant, Intermittent,
- Clinical presentation
- Investigation
- Management

18. Microtropia

19. Dissociated vertical deviation

- Characteristics
- Aetiology
- Diagnosis
- Measurement
- Management

20. A lphabetic patterns

- Causes,
- Investigations
- Management

21. Vertical deviations

- Comitant & incomitant vertical deviations
- Superior oblique & Inferior Oblique Overactions
- Paralysis of Superior Rectus, Inferior rectus, Superior Oblique, Inferior oblique

22. Orthoptic Exercises

- Goals
- Purpose
- Anti-suppression therapy
- Occlusion
- Prisms
- Lenses
- Convergence building
- Divergence building
- Physiological Diplopia

23. Sensory adaptations

- Development of sensory adaptations in strabismus
- Amblyopia (types- refractive, deprivation, Amblyopia ex anisometropia, strabismic)
- Eccentric fixation
- Anomalous retinal correspondence (harmonious, disharmonious)
- Suppression – clinical signs and investigation

24. Amblyopia

- Pathogenesis and pathophysiology of amblyopia
- Classification and terminology
- Clinical features
- Fixation pattern of the amblyopic eye
- Diagnosis

25. Management of Comitant strabismus

- Occlusion therapy
- Pleoptics
- antisuppression training
- Restoration of normal correspondence
- Selection of cases for treatment and prognosis
- Pre and post-surgical Orthoptic

26. Incomitant strabismus

- Development of motor adaptations; clinical signs and investigations
- Indications for referral
- Orthoptic management

27. Nystagmus- types

- Latent and manifest nystagmus
- Forms of nystagmus (congenital and acquired)
- Acquired nystagmus

28. Nystagmus- management

- Clinical investigations and significance
- Orthoptic management

29. Special forms of strabismus

- Duane syndrome
- Mobius syndrome
- Grave's disease and dysthyriod ophthalmopathy
- Myasthenia Gravis
- Congenital fibrosis syndrome
- Marcus Jaw winking
- Gardenigo's Syndrome

- Ocular motor Apraxia
- Chronic Progressive ExternalOphthalmoplegia
- Congenital fibrosis of extraocular muscles
- Congenital cranial disinnervation disorders
- Internuclear ophthalmoplegia
- Superior oblique myokemia

RECOMMENDED BOOKS

- See at the end of the Orthoptics Curriculum.

COURSE CODE: M 4205 MANAGEMENT OF DISORDERS & DISPENSING OPTICS CREDIT HOURS: (02-02) 04

Objectives

This course will enable students

- To discuss management of ocular motility anomalies, strabismus and binocular single vision disorders
- To develop knowledge of historical and current treatment modalities both non-surgical and surgical
- To enable to develop management plan, appropriate referral to ophthalmologist and to other eye or health care professional using multifaceted management approach
- To capable of application of appropriate management plans in case scenarios.
- To use different management options for rehabilitation; ocular and general

Course Contents

1. **Optical Management**
2. **Prism Management**
3. **Pharmacology Motility Treatment**
4. **Orthoptic treatment**
5. **Vergence method of ray tracing**
    - Basic optical properties of single vision lenses
6. **Focimetry**
    - Ophthalmic lens power and form presentation
    - Lens power and form transposition
    - Prescription writing
7. **Prism Dispensing**
    - Decentration
    - Incorporational
    - Fresnel
8. **Lens shapes' presentations**
    - Measurement of IPD
    - Ophthalmic prisms and lens decentration
    - Prismatic effects of lens decentration

9. Lens materials and fabrications

- Optical and physical properties of common lens materials
- Selection

10. Introduction to Lens making

- Frame materials and types
- Merits of different types of lens materials
- Frame components and types
- Effects of frame design on fitting
- Frame and face measurements

11. Bifocals & trifocals

- Principles and terminology
- Optical properties and fitting

12. Multifocals

- Principles and terminology
- Optical properties and fitting

13. Considerations of lens thickness and calculations

- Calculation of thickness in edged lenses
- Lens affectivity
- Effects of working distance and vertex distance on the refractive powers of lenses

14. Spectacle fitting

- Factors to be considered in lens and frame selection
- Principles and practical aspects of frame fitting

15. Tinted lenses

- Radiation and the eye
- Ophthalmic uses of tinted and photochromic lenses

RECOMMENDED BOOKS

- See at the end of the Orthoptics Curriculum.

COURSE CODE: M 4206 **NEURO ORTHOPTICS / NEURO-OPHTHALMOLOGY** **CREDIT HOURS: (03-02) 05**

Objectives

This course will enable students

- To understand the neuronal pathways for different eye Movements
- To develop awareness of association of eye movement disorders with neurological disorders
- To analyze anomalies of eye movements and review of etiology with consideration of systemic or neurological diseases
- To develop orthoptic skills for clinical investigation and using management options of visual problems in relation to neurological or other ophthlamic conditions for rehabilitation
- To develop capability to work as part of multidisciplinary team effectively and efficiently

Course Contents

1. **Symptomatology**

2. **Non organic diseases**

3. The way the eyes move & pathways of control
    - Purpose
    - Saccades (horizontal & vertical)
    - Smooth pursuit system
    - Vergence system
    - Vestibular- ocular response & Optokinetic response
    - Brainstem control

4. **Myogenic disorders**
    - Thyroid eye disease
    - Chronic progressive external ophthalmoplegia
    - Myasthenia gravis
    - Myotonic dystrophy
    - Ocular myositis
    - Kearns- Sayre Ophthalmoplegia

5. Mechanical Paralytic Strabismus

- Congenital cranial dysinnervation disorders (Duane's Retraction Syndrome, vertical retraction syndrome, congenital fibrosis of extraocular muscles)
- Brown's Syndrome
- Adherence syndrome
- Mobius syndrome
- Strabismus fixus syndrome
- Thyroid eye disease
- Orbital injury
- Blow out fracture
- Soft tissue injury

6. Neurogenic disorders

- Third cranial nerve & its lesions
- Sixth cranial nerve and its lesions
- Trochlear nerve & its lesions, Superior oblique myokemia
- Trigeminal nerve & its lesions
- Seventh nerve and its lesions
- Acquired motor fusion deficiency
- Ophthalmoplegia (cavernous sinus syndrome, sphenoidal fissure syndrome, orbital apex syndrome, Gullian-Barre syndrome- Fisher's syndrome, ophthalmoplegia migraine, Tolosa- hunt syndrome)

7. Internuclear disorders

- Internuclear ophthalmoplegia
- One and a half syndrome

8. Supranuclear disorders

- Saccadic movement disorders
- Ocular motor apraxia
- Smooth pursuit movement disorders
- Vergence movement disorders
- Gaze palsy
- Complete gaze palsy
- Optokinetic movement disorders
- Vestibular movement disorders
- Brainstem syndromes
- Skew deviation
- Ocular tilt reaction

9. Hyperactivity of oculomotor nerves

10. Myopathies affecting extra ocular muscles

11. Nystagmus

- Etiology
- Classification
- Investigation
- management

12. Craniofacial synostoses

- Plagiocephaly
- Brachycephaly
- Occipital plagiocephaly
- Scaphocephaly/ doiocephaly
- Apert's syndrome
- Crouzon's syndrome
- Caraniofrontonasal dysplasia
- General signs and symptoms
- Ocular signs and symptoms
- management

13. Pupils

- Pathway
- Pathology

COURSE CODE: M 4207 APPLIED STATISTICS CREDIT HOURS: (01-04) 05
RESEARCH METHODOLOGY & PROJECT

Objectives

This course will enable students to;

- Develop an understanding of relationship between epidemiology, biostatistics and research methodology.
- Understand and learn the basic concepts and introduction of research methodology at undergraduate student level as it applies to vision sciences, in particular the principles of basic epidemiology, epidemiological study designs, data collection, assimilation and analysis (applied biostatistics).
- Learn the use of a common software for research (Statistical Package for Social Sciences or SPSS, latest version)

Course Contents

- Review of basic epidemiology
- Epidemiological studies
    - Descriptive
    - Analytical
    - Experimental
- Research Methodology
    - Synopsis writing
    - Research Question
    - Literature Review
    - Formulation of objectives and selecting a suitable study design
    - Collection and cleaning of data
    - Data analysis
    - Writing Results
    - Report (Dissertation & Article) writing
    - Discussion
    - Referencing
- Basic and Applied Biostatistics
    - Review of basic biostatistics
    - Choosing and using appropriate statistical tools
    - Hypothesis testing
    - Tests of significance
    - Interpretation of results

PRACTICAL

- Selection of appropriate population and sample
- Development of data collection tool
- Data Collection, cleaning and entry on computer using SPSS
- Data Analysis
- Dissertation writing
- Article writing

COURSE CODE: M 4209 **ADVANCED INCLUSIVE EYE HEALTH** **CREDIT HOURS: (01-00) 01**

Objectives

This course will enable students to

- Understand the epidemiology of disability and its implications for health professionals
- Understand community based inclusive development
- Understand the role of inclusive approach in screening programs and during eye health intervention in emergencies and disasters
- Understand the role of assistive/adaptive technology in promoting inclusion

Course Contents

1 Refresher of the Intermediate Module

- UNCRPD and SDGs – concepts and principles for health professionals
- DPOs and rehabilitation services – their relationship to inclusive eye health
- Universal Design – recalling what we mean by it

2 Epidemiology of Disability

- Epidemiology of Disability in Pakistan
- Understanding the difference between 'Disabled Persons' and 'Disabilities'
- Introduce use of terms Disability Adjusted Life Years, Quality Adjusted Life Years, Years of Life Lost to Disability
- Estimating the need of services for Persons with Disabilities using a district model

3 Children with blindness and other disabilities

- What is childhood blindness and how can we estimate its magnitude and need for services using a district model
- Why is it important
- What implications does this have for clinical practice
- How can clinical services, including Low Vision services, engage and interface with other sectors like education and social services to address childhood blindness
- How one can practice the principles of inclusion when approaching children with disability (especially small children)

4 Community Based Inclusive Development

- What is CBID – what is the difference with CBR
- How is CBID provided in Pakistan and by whom
- How can clinical services and health professionals interface with CBID programs
- What role can clinical services play in supporting CBID

5 Communication

- Recalling Essential Pakistan Sign Language Vocabulary for Clinicians and Health Professionals
- Recalling Confidence in communicating with people with all types of impairments and from other language groups

6 Screening programs

- How can we make an eye health screening programs inclusive
- Guidelines for screening camps

7 Emergencies and Disasters

- What do you understand by emergencies and disasters
- What sort of emergencies and disasters has Pakistan faced in the last 15 years
- What groups of people in disaster affected areas are likely to be the most vulnerable and why – emphasise women, children and persons who are aged, those with disabilities, or otherwise socially excluded
- If you were asked to set up eye health services in emergency situations, how would you incorporate the principles and concepts of inclusive eye health, recalling all you have learnt so far

8 Assistive / Adaptive Technology

- Orientation on assistive/adaptive technology for clients of low vision, hearing and mobility impairment

RECOMMENDED BOOKS / ARTICLES

- INCLUSION MADE EASY © CBM A quick program guide to disability in development Link to book; https://www.cbm.org/fileadmin/user_upload/Publications/cbm_inclusion_made_easy_a_quick guide_to_disability_in_development.pdf
- INCLUSION MADE EASY IN EYE HEALTH PROGRAMS Disability inclusive practices for strengthening comprehensive eye care
- https://www.cbm.org/fileadmin/user_upload/Publications/CBM-DID-TOOLKIT-accessible.pdf
- Disability as Diversity, A Guidebook for Inclusion in Medicine, Nursing, and the Health Professions, Editors: Meeks, Lisa M., Neal-Boylan, Leslie (Eds.)
- Inclusive Health Promotion: Public Health Remedy for People with Disabilities Paperback – by Rebecca Mabaso
- Inclusive Practice for Health Professionals 1st Edition by Jenny Davis, Melanie Birks, Ysanne Chapman

RECOMMENDED BOOKS AND READING MATERIAL
B.SC. (HONS.) V&AHS, (ORTHOPTICS)

1. Orthoptics: Handbook of Practical Skills, Mari Gutter , Jesca van Petegem-Hellemans , Ingrid van Wijnen-Segeren , Hinke Marijke Jellema
2. Pickwell's binocular vision anomalies: investigation and treatment, Volume 1, By Bruce J. W. Evans, David Pickwell
3. Binocular Vision and Ocular Motility: Theory and Management of Strabismus, Authors: Gunter K. von Noorden, MD and Emilio C. Campos, MD
4. Eye Movement Disorders by Agnes M. F. Wong
5. Diagnosis and management of ocular motility disorders By Alec M. Ansons, Helen Davies, Joyce Mein
6. Clinical strabismus management: principles and surgical techniques By Arthur L. Rosenbaum, Alvina Pauline Santiag
7. Pediatric ophthalmology and strabismus By Kenneth Weston Wright, Peter H. Spiegel
8. *Neuroscience*: exploring the brain by Mark F. Bear, Barry W. Connors, Michael A. Paradiso
9. Neurophysiology of vision John M Lee
10. Walsh and Hoyt's clinical neuro-ophthalmology: the essentials By Frank Burton Walsh, Nancy J. Newman, William Fletcher Hoyt, Neil R. Miller, Valérie Biousse, John B. Kerrison
11. Clinical pathways in neuro-ophthalmology: an evidence-based approach By Andrew G. Lee, Paul W. Brazis
12. The neurology of eye movements, R. John Leigh, David S. Zee
13. Neuro-ophthalmology: neuronal control of eye movements By Andreas Straube, U. Büttner
14. Eye Movement Disorders by Agnes M. F. Wong
15. Diagnosis and management of ocular motility disorders By Alec M. Ansons, Helen Davies, Joyce Mein
16. Clinical strabismus management: principles and surgical techniques By Arthur L. Rosenbaum, Alvina Pauline Santiag
17. Pediatric Ophthalmology & Strabismus by Creig S. Hoyt, David Taylor
18. Handbook of Pediatric Neuro-Ophthalmology By Kenneth W. Wright, T.C. Hengst, S. Gilbert, Peter H. Spiegel, F. Cogswell, Lisa S. Thompson
19. Foundations of Binocular Vision: A Clinical Perspective by Ralph P. Garzia,McGraw Hill Professional
20. Essentials of Clinical Binocular Vision by Erik M. Weissberg, Butterworth-Heinemann
21. Clinical Orthoptics, 3rd Edition Fiona J. Rowe

22. Binocular Vision and Orthoptics: Investigation and Management by Sandip Doshi, Bruce J. W. Evans Butterworth-Heinemann
23. Lyle and Jackson's Practical orthoptics in the treatment of squint and other anomalies of binocular vision Thomas Keith Lyle, Sylvia Jackson, Kenneth Cullen Wybar
24. Prisms in the medical and surgical management of strabismus by Suzanne Véronneau-Troutman; Mosby, Incorporated,
25. Clinical Management of Binocular Vision: Heterophoric, Accommodative, and ...By Mitchell Scheiman, Bruce Wick
26. Visual development, Diagnosis & Treatment of the Pediatric Patient by Robert H. Duckman
27. Pediatric Ophthalmology: Current Thought and A Practical Guide By Edward M. Wilson, Richard Saunders, Trivedi Rupal
28. Practical Binocular Vision Assessment, Volume 1, Frank Eperjesi, M. M. Rundstrom Butterworth-Heinemann

RECOMMENDED JOURNALS

1. American Orthoptic Journal
2. Journal of American Association for Pediatric Ophthalmology & Strabismus
3. The British Orthoptic Journal
4. Journal of Pediatric Ophthalmology & Strabismus
5. Journal of Neuro- Ophthalmology
6. Journal of Neuroscience
7. British & Irish Orthoptic Journal
8. Australian Orthoptic Journal

COURSE CONTENT OF FOURTH PROFESSIONAL YEAR

(Investigative Oculist)

LEARNING OBJECTIVES OF INVESTIGATIVE OCULIST

This course of specialization will enable students to

- Perform B scan, OCT, FFA, Perimeter, HRT Biometry etc. independently.
- Understand the optics and maintenance of all diagnostic equipment.
- Preliminary diagnose posterior segment's pathologies using different diagnostic procedures.

COURSE CODE: M 4301 **REVIEW OF ANATOMY OF EYE AND ORBIT** **CREDIT HOURS: (02-00) 02**

Course Contents

1. Review of anatomy of the orbit and the eye

- Embryology of the eye & the embryological basis of the diseases , orbit, ocular adnexa & the eyeball
- Nerve supply and blood supply of the orbit
- Review of the ocular physiology of the anterior segment, cornea, uvea and lens
- Physiology of aqueous and intraocular pressure
- The synthesis, composition and drainage
- The IOP its origin, range of distribution in the population, measurement, diurnal variation and the factor affection IOP

2. Review of ocular anatomy and physiology of Posterior Segment

- Retina
- Choroid
- Vitreous
- Sclera
- Optic nerve

3. Cardio Pulmonary Resuscitation (CPR)

4. Diseases of the Anterior segment

- Cornea, uvea, lens

5. Advance ocular diseases

- Diseases of the ocular adnexa

6. Diseases of the Posterior segment

- Retinal detachments
- Hereditary fundus dystrophies
- Acquired macular disorders
- Retinal vascular diseases

COURSE CODE: M 4302 **REVIEW OF BIOMEDICAL ENGINEERING & OPTICS** **CREDIT HOURS: (02-01) 03**

Course Contents

- Introduction to biomedical engineering
- The concept of preventive maintenance
- Working and maintenance of diagnostic ophthalmic instruments and equipment
- Working and maintenance of sterilization and miscellaneous ophthalmic instruments and equipment
- Working and maintenance of sterilization and miscellaneous ophthalmic instruments and equipment
- Optics of
    - Retinoscopes
    - Ophthalmoscope
    - Slit lamp
    - Keratometers
    - Focimeter
    - Tonometers
    - Microscopes
    - A scan & B scan
    - Fundus camera
    - OCT
    - Pachymeter
    - Perimeter

PRACTICALS

Optics and parts of all equipment

COURSE CODE: M 4303 OPHTHALMIC PHOTOGRAPHY & FLUORESCEIN ANGIOGRAPHY CREDIT HOURS: (02-01) 03

Course Contents

- Clinical uses Ophthalmic photography
- External photography of the eye
- Anterior segment photography – slit lamp photography
- Posterior segment photography – Fundus photography
- Fundus camera , types of fundus camera, Maintenance of fundus camera
- Techniques of fundus photography
- Preparation of room, planning the photographs etc.
- Points of specific importance
- Dilating the pupil, setting the reticule, difficult clinical situations, photographs through small or poorly dilated pupil which eye photograph 1st when both affected.
- Artifacts, causes, types , Managing the challenging cases like illumination problems and the pupil size, media opacities, importance of adequate tear film over cornea, light sensitive patient , drooping eyelid, children
- Advance techniques
- Photographing the periphery, post laser , photography with various diagnostic lenses at the slit lamp
- Stereo fundus photography

- **Fluorescein angiography**
    - Basic concept of angiography
    - Uses of ophthalmic angiography
    - Use of various filters in ophthalmic angiography
    - Procedure
    - Preparation to follow up

- **Phases of normal angiogram**
    - Common problems in performing FFA and their management
    - Pseudo Fluorescence
    - Auto Fluorescence, fluorescene timing, late appearance of the dye.
    - Advance angiographic techniques
    - Oral angiograms, Children under GA ,Anterior segment angiography
    - Colour fundus photography
    - Indocyanine Green angiography
    - Side effects of fluorescein and indocyanine green and their management

PRACTICALS

Taking color fundus photographs independently
Preparation of patients
Perform FFA
Side effects of fluorescein sodium management

COURSE CODE: M 4304 **OCT & HRT** **CREDIT HOURS: (01-01) 02**

Course Contents

OCT:

- Principle of OCT
- Indication of OCT
- Different types of OCT
- Understanding and interpretation of OCT macula printout.
- Understanding and interpretation of OCT glaucoma printout.

HRT:

- Principle and indications of HRT
- Difference in OCT and HRT
- Understanding and interpretation of HRT
- Explain CSLO

PRACTICALS

Perform OCT and HRT independently

Interprate OCT and HRT printouts

COURSE CODE: M 4305 **B. SCAN** **CREDIT HOURS: (01-01) 02**

Course Contents

- Principle of B. Scan
- Indications of B. Scan
- Causes of echogenic vitreous
- Echogenic appearance of different types of retinal detachment on B. Scan
- Differentiate between PVD, RD and choroidal detachment on B. Scan
- Structures of eye not visible on normal B. Scan
- Artifacts on B. Scan

PRACTICALS

Perform B. Scan and diagnose different pathologies

COURSE CODE: M 4306 **PERIMETERY** **CREDIT HOURS: (02-01) 03**

Course Contents

- Macular function tests
- Static and kinetic perimetry
- Strategies of automated static perimetry
- Understanding and interpretation of visual field printout
- Visual field loss / defects in glaucoma
- Neurological visual field defects and visual pathway
- Follow-up VF examination
- Custom and screening VF tests
- What is SWAP and FDT

PRACTICALS

Perform perimetry independently

Interperate visual field printout

COURSE CODE: M 4307 **BIOMETRY** **CREDIT HOURS: (02-01) 03**

Course Contents

- Keratometry
- A. Scan
- Role of A-constant
- Different formulas for IOL calculation
- Formulas for short and long axial length of eyeball
- Measurement of axial length in different difficult situations of eyeball
- Different methods of axial length measurement
- Steps of contact biometry
- Steps of immersion biometry
- Biometry after refractive surgery

PRACTICALS

Perform Keratometry

Perfrom A. Scan

IOL calculation

COURSE CODE: M 4308 **ERG, VEP, EOG AND OPHTHALMIC LASER** **CREDIT HOURS: (01-00) 01**

Course Contents

Electrophysiological tests (VEP, ERG, EOG)

- Introduction to various diagnostic procedures in practice
- Introduction ERG and its techniques , various types of ERG,
- Factor affecting ERG
- Electrodes of ERG
- Introduction to EOG and its techniques
- Introduction to VEP and its techniques

OPHTHALMIC LASER

- Introduction to laser
- Common uses of laser in ophthalmology and their unique properties
- Assisting in laser application – preparation of the room, preparation of the patient for various procedures, check list of items and equipment needed in laser room.
- Refractive laser , types and complications
- Common complications of laser – based procedures
- Safety measures at a laser clinic

PRACTICALS

Observe and perform ERG and LASER

Interparate ERG Printouts

COURSE CODE: M 4309 EYE BANKING CREDIT HOURS: (01-01) 02

Course Contents

1. Eye banking

- Introduction to tissue transplantation, types of transplant,
- Tissue transplantation in ophthalmology
- Graft rejection
- Serological tests required & storage techniques of corneas
- Serological tests required & storage techniques of corneas
- Serological tests required & storage techniques of corneas
- The concept of an eye bank, An ideal eye bank set up
- Infrastructural requirements, Human resource needs
- The concept of an eye bank, An ideal eye bank set up
- Infrastructural requirements, Human resource needs
- The concept of an eye bank, An ideal eye bank set up
- Infrastructural requirements ,Human resource needs
- Management of an eye bank
- Managerial requirement
- Management of an eye bank
- Managerial requirement
- Management of an eye bank
- Managerial requirement
- Professional ethics and the legal and social implications of misconduct
- Professional ethics and the legal and social implications of misconduct

PRACTICAL TRAINING

- Eye bank management
- Setting up an eye bank
- Eye bank operation

COURSE CODE: M 4310 **APPLIED STATISTICS, RESEARCH METHODOLOGY AND PROJECT** **CREDIT HOURS: (02-03) 05**

Course Contents

- Research ethics and research methodology
- Reviewing and criticizing the literature
- Structuring a literature review and a research report
- Experimental design
- Applied statistics
- Describing and displaying quantitative data
- Choosing and using appropriate statistical tools
- Interpreting and reporting the result and tests

PRACTICALS

Thesis writing

COURSE CODE: M 4310 APPLIED STATISTICS CREDIT HOURS: (02-03) 05

RESEARCH METHODOLOGY & PROJECT

Objectives

This course will enable students to;

- Develop an understanding of relationship between epidemiology, biostatistics and research methodology.
- Understand and learn the basic concepts and introduction of research methodology at undergraduate student level as it applies to vision sciences, in particular the principles of basic epidemiology, epidemiological study designs, data collection, assimilation and analysis (applied biostatistics).
- Learn the use of a common software for research (Statistical Package for Social Sciences or SPSS, latest version)

Course Contents

- Review of basic epidemiology
- Epidemiological studies
    - Descriptive
    - Analytical
    - Experimental
- Research Methodology
    - Synopsis writing
    - Research Question
    - Literature Review
    - Formulation of objectives and selecting a suitable study design
    - Collection and cleaning of data
    - Data analysis
    - Writing Results
    - Report (Dissertation & Article) writing
    - Discussion
    - Referencing
- Basic and Applied Biostatistics
    - Review of basic biostatistics
    - Choosing and using appropriate statistical tools
    - Hypothesis testing
    - Tests of significance
    - Interpretation of results

PRACTICAL

- Selection of appropriate population and sample
- Development of data collection tool
- Data Collection, cleaning and entry on computer using SPSS
- Data Analysis
- Dissertation writing
- Article writing

COURSE CODE: M 4311 **ADVANCED INCLUSIVE EYE HEALTH** **CREDIT HOURS: (01-00) 01**

Course Contents

1. Refresher of the Intermediate Module

- UNCRD and SDGs – concepts and principles for health professionals
- DPOs and rehabilitation services – their relationship to inclusive eye health
- Universal Design – recalling what we mean by it

2. Epidemiology of Disability

- Epidemiology of Disability in Pakistan
- Understanding the difference between 'Disabled Persons' and 'Disabilities'
- Introduce use of terms Disability Adjusted Life Years, Quality Adjusted Life Years, Years of Life Lost to Disability
- Estimating the need of services for Persons with Disabilities using a district model

3. Children with blindness and other disabilities

- What is childhood blindness and how can we estimate its magnitude and need for services using a district model
- Why is it important
- What implications does this have for clinical practice.
- How can clinical services, including Low Vision services, engage and interface with other sectors like education and social services to address childhood blindness
- How one can practice the principles of inclusion when approaching children with disability (especially small children)

4. Community Based Inclusive Development

- What is CBID – what is the difference with CBR
- How is CBID provided in Pakistan and by whom
- How can clinical services and health professionals interface with CBID programs
- What role can clinical services play in supporting CBID

5. Communication

- Recalling Essential Pakistan Sign Language Vocabulary for Clinicians and Health Professionals
- Recalling Confidence in communicating with people with all types of impairments and from other language groups

6. Screening programs

- How can we make an eye health screening programs inclusive
- Guidelines for screening camps

7. Emergencies and Disasters

- What do you understand by emergencies and disasters
- What sort of emergencies and disasters has Pakistan faced in the last 15 years
- What groups of people in disaster affected areas are likely to be the most vulnerable and why – emphasize women, children and persons who are aged, those with disabilities, or otherwise socially excluded
- If you were asked to set up eye health services in emergency situations, how would you incorporate the principles and concepts of inclusive eye health, recalling all you have learnt so far

8. Assistive / Adaptive Technology

- Orientation on assistive/adaptive technology for clients of low vision, hearing and mobility impairment.

RECOMMENDED BOOKS FOR INVESTIGATIVE OCULIST

- Clinical anatomy of the eye, 2nd edition by Richard S. Snell, Michael A. Lemp
- Clinical Ophthalmology by Jack J Kanski, 8th edition
- Ophthalmic Ultrasonography By Arun d. Singh, Brandy C. Hayden
- Ultra sound of Eye and Orbit, 2nd edition By Sandra Frazier Byrne, Ronald L. Gree
- Atlas of Fundus Flourescein Angiography By Snkara Nethralya
- Ophthalmic Photography, 2nd edition By Patrick j. Saine, Marshall E. Tyler
- Clinical En Face OCT Atlas By Bruno Lumbroso, David Huang, Andre Romano, Marco Respoli, Gabreil Coscas.
- Practical Handbook of OCT By Bruno Lumbroso, Marco Rispoli
- Practical guide to interpret Vields, 3rd edition By GR Greddy
- Optics and Refraction, 4th edition By A K Khurana
- Ophtjalmic Laser Therapy By Daniel Palanker
- Eye Banking and Keratoplasty By Markandy Ahuja

PART E

ASSESSMENT SCHEME FOR BSC. (HONS.) VISION SCIENCES

1. Internal Assessment Criteria

i. A 100 marks paper will be taken by course tutor at the end of each module

ii. Obtained marks of each module will be displayed in transcript

iii. Internal assessment will constitute 20 marks for logbook and overall 80 marks for all modules

2. The Log Book

It should contain record of participation of student in following activities;

- Daily Teaching.
- Training (skill learning)
- Scholarly activities
- Course assessments.

b. There will be a separate logbook for each calendar year.

c. Logbook will be assessed at the end of each year by the supervisor and marks will be awarded.

d. These marks will be included in the internal assessment of the Professional examination.

3. <u>Professional examination eligibility criteria:</u>

a. To appear in Professional Examination, a candidate shall be required:

i. To have completed 75% attendance in complete one academic year.

ii. To have submitted evidence of payment of examination fee.

iii. To have 'satisfactory work' certificate for research work by the Program Director for 4^{th} professional examination only.

C. Candidate(s) who fail to achieve 75% attendance at the end of complete academic year will not be allowed to sit in the Annual Examination. No makeup/ reset classes will be arranged. Candidate (s) will not be allowed to sit in supplementary examination. He will repeat whole year classes and will appear in next annual examination.

4. Declaration of result

a. Final result of the professional examination will include 100 marks as final internal assessment which includes 80 marks for internal assessment, 20 marks for logbook and 100 marks for theory, 100 marks for practical for each paper.
b. The candidate will have to score 50 % marks in written and 50 % marks in the oral and practical examination with a cumulative score of 50%, to be declared successful in the Professional Examination and will be upgraded to next year.
c. Islamic studies/ Pakistan Studies passing score will be 33%.
d. Candidates who fail to secure 50% marks in either theory paper or practical examination will be required to appear in failed component in supplementary examination.
e. Candidates who fail to secure 50% marks in one or more of the papers will be required to sit in the same paper in supplementary examination.
f. Candidates who fail to secure 50% marks in supplementary examination will be allowed to appear in next annual examination for the failed component only.
g. Candidate who fail to score 50% marks even in supplementary examination will not be promoted to next year.
h. Candidate will have four chances (availed/Un-availed) in First Professional Examination. Candidates who fail to pass First Professional Examination in four attempts will be expelled from the Program. There is no such restriction in second, third and fourth professional examination. The Maximum duration for degree completion will be 7 years after that candidate will not be allowed to sit in any exam.

4. Examination Schedule and Fee

a. There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination
b. Examination fee will be determined periodically by the university.
c. The examination fee once deposited shall not be refunded. But fee can be carried over to the next examination, if the attempt is not availed due to valid reasons.
d. The Controller of Examination will issue Roll Number Slips/Admittance Card on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

5. Panel of Examiners:

a. The examiner can only be appointed for an examination if he/she qualifies equivalent or greater than the qualification being offered in the program.
b. Program faculty committee will send list of 'Initial paper setter', 'Final paper setters', 'Paper assessor', 'Internal examiner' and external examiner' to the Dean AHS.
c. Dean AHS will forward this list to the Controller Examination.
d. Controller Examination will ask the 'Initial paper setter' to submit three sets of each paper to Controller Examination who will select one of them blindly to include in the paper.

6. Detail Marks Certificate (DMC) / Transcript:

a. All the graduates after completing a program of study will be entitled to receive the Detailed Marks Certificate (DMC) Transcripts with percentage and grades.
b. Adequate information will be provided on Degree, Detailed Marks Sheet and Transcript with a seal that ensures that the degree is authentic.

TABLE OF SPECIFICATIONS for B.Sc(Hons) Vision Sciences

YEAR	PAPERS	INCLUDED MODULES	FORMAT		MARKS	TOTAL
FIRST PROFESSIONAL EXAM	Paper I	1. Introduction to Anatomy	15 MCQ	3 SEQ	15 & 15	100
		2. Introduction to Physiology	15 MCQ	3 SEQ	15 & 15	
		3. Introduction to Biochemistry	10 MCQ	2 SEQ	10 & 10	
		4. Physics	10 MCQ	2 SEQ	10 & 10	
	Paper II	1. Introduction to Pathology	15 MCQ	3 SEQ	15 & 15	100
		2. Introduction to Pharmacology	15 MCQ	3 SEQ	15 & 15	
		3. Biostatistics and Epidemiology	10 MCQ	2 SEQ	10 & 10	
		4. English	10 MCQ	2 SEQ	10 & 10	
	Paper III	1. Islamic Studies	25 MCQ	5 SEQ	25 & 25	100
		2. Pakistan Studies	25 MCQ	5 SEQ	25 & 25	
	Oral & Practical Examination	1. Introduction to Anatomy	Demonstration / Viva Voice		40	200
		2. Introduction to Physiology			40	
		3. Introduction to Pathology			40	
		4. Introduction to Pharmacology			40	
		5. Basic Computer and Information Sciences			40	
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for First Professional Examination = 600						

YEAR	PAPERS	INCLUDED MODULES	FORMAT		MARKS	TOTAL
SECOND PROFESSIONAL EXAM	Paper I	1. Ocular Anatomy	10 MCQ	01 SEQ	10 & 10	100
		2. Ocular Physiology	10 MCQ	01 SEQ	10 & 10	
		3. Basic Optics & Refractions	10 MCQ	01 SEQ	10 & 10	
		4. Geometrical Optics	10 MCQ	01 SEQ	10 & 10	
		5. Epidemiology	05 MCQ	----	05 & 00	
		6. Inclusive Eye Health	05 MCQ	01 SEQ	05 & 10	
	Paper II	1. Ocular Pharmacology	10 MCQ	01 SEQ	10 & 10	100
		2. Ocular Pathology	10 MCQ	01 SEQ	10 & 10	
		3. Advanced Visual Functions	10 MCQ	01 SEQ	10 & 10	
		4. Physical Optics	10 MCQ	01 SEQ	10 & 10	
		5. Ophthalmic Nursing	05 MCQ	01 SEQ	05 & 10	
		6. Communication Skills	05 MCQ	----	05 & 00	
	Oral & Practical Examination	1. Ocular Anatomy	Demonstration / Viva Voice		20	200
		2. Ocular Physiology			20	
		3. Basic Optics & Refractions			20	
		4. Geometrical Optics			20	
		5. Ocular Pharmacology			20	
		6. Ocular Pathology			20	
		7. Advanced Visual Functions			20	
		8. Physical Optics			20	
		9. Epidemiology			10	
		10. Inclusive Eye Health			10	
		11. Ophthalmic Nursing			10	
		12. Communication Skills			10	
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for Second Professional Examination = 500						

Year	Papers	Included Modules	Format		Marks	Total
THIRD PROFESSIONAL EXAM	Paper I	1. Primary Health Care & Primary Eye-care	05 MCQ	0.5 SEQ	05 & 05	100
		2. Advanced refraction & Retinoscopy	10 MCQ	01 SEQ	10 & 10	
		3. Avoidable & unavoidable causes of blindness	05 MCQ	0.5 SEQ	05 & 05	
		4. Basic dispensing optics	10 MCQ	01 SEQ	10 & 10	
		5. Ophthalmic instruments & their maintenance	10 MCQ	01 SEQ	10 & 10	
		6. Low vision	10 MCQ	01 SEQ	10 & 10	
	Paper II	1. Inclusive Eye Health Intermediate	05 MCQ	0.5 SEQ	05 & 05	100
		2. Contact lenses	10 MCQ	01 SEQ	10 & 10	
		3. Ocular motility & Binocular single vision	05 MCQ	0.5 SEQ	05 & 05	
		4. Orthoptic techniques	05 MCQ	0.5 SEQ	05 & 05	
		5. Patient dealing ethics	05 MCQ	0.5 SEQ	05 & 05	
		6. Application of advanced visual functions	10 MCQ	01 SEQ	10 & 10	
		7. Advanced diseases of eye & their management	10 MCQ	01 SEQ	10 & 10	
	Oral & Practical Examination	1. Inclusive Eye Health Intermediate	Demonstration / Viva Voice		10	200
		2. Advanced refraction & Retinoscopy			20	
		3. Practical Retinoscopy			20	
		4. Basic dispensing optics			10	
		5. Ophthalmic instruments & their maintenance			10	
		6. Contact lenses			20	
		7. Low vision			20	
		8. Ocular motility & Binocular single vision			10	
		9. Orthoptic techniques			10	
		10. Patient dealing ethics			20	
		11. Application of advanced visual functions			20	
		12. Advanced diseases of eye & their management			30	
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for Third Professional Examination = 500						

Year	Papers	Included Modules	Format		Marks	Total
FOURTH PROFESSIONAL EXAMINATION (OPTOMETRY)	Paper I	1. Review of basics of vision and optics	10 MCQ	01 SEQ	10 & 10	100
		2. Visual Sciences 1,2,3,4	15 MCQ	1.5 SEQ	15 & 15	
		3. Contact lenses	10 MCQ	01 SEQ	10 & 10	
		4. Binocular vision & its Clinical Application	15 MCQ	1.5 SEQ	15 & 15	
	Paper II	1. Dispensing optics	15 MCQ	01 SEQ	10 & 10	100
		2. Applied statistics, Research Methodology & Project	10 MCQ	01 SEQ	10 & 10	
		3. Clinical Optometry	15 MCQ	1.5 SEQ	15 & 15	
		4. Inclusive Eye health Advanced	10 MCQ	01 SEQ	10 & 10	
	Oral & Practical Examination	1. Review of basics of vision and optics	Demonstration / Viva Voice		30	200
		2. Visual Sciences 1,2,3,4			30	
		3. Binocular vision & its Clinical Application			30	
		4. Clinical Optometry			30	
		5. Dispensing optics			30	
		6. Contact lenses			30	
		7. Applied statistics, Research Methodology & Project			10	
		8. Inclusive Eye health Advanced			10	
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for Fourth Professional Examination = 500						

Year	Papers	Included Modules	Format		Marks	Total
FOURTH PROFESSIONAL EXAMINATION (ORTHOPTICS)	Paper I	1. Review of basics of vision and optics	10 MCQ	01 SEQ	10 & 10	100
		2. Visual Sciences 1,2,3,4	10 MCQ	01 SEQ	10 & 10	
		3. Clinical Orthoptics	20 MCQ	02 SEQ	20 & 20	
		4. Inclusive Eye Health Advanced	10 MCQ	01 SEQ	10 & 10	
	Paper II	1. Binocular vision & its Clinical Application	20 MCQ	02 SEQ	20 & 20	100
		2. Neuro-Orthoptics / Neuro-ophthalmology	15 MCQ	02 SEQ	15 & 20	
		3. Management of Disorders & Dispensing Optics	15 MCQ	01 SEQ	15 & 10	
	Oral & Practical Examination	1. Review of basics of vision and optics	Long Case		50	200
		2. Visual Sciences 1,2,3,4	Short Case		50	
		3. Clinical Orthoptics	Table Viva		50	
		4. Binocular vision & its Clinical Application	ToACS		50	
		5. Management of Disorders & Dispensing Optics				
		6. Neuro-Orthoptics / Neuro-ophthalmology				
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for Fourth Professional Examination = 500						

Year	Papers	Included Modules	Format		Marks	Total
FOURTH PROFESSIONAL EXAMINATION (INVESTIGATIVE OCULIST)	Paper I	1. Review of Anatomy of Eye and Orbit	10 MCQ	01 SEQ	10 & 10	100
		2. Ophthalmic photography & fluorescein angiography	10 MCQ	01 SEQ	10 & 10	
		3. Biometry	10 MCQ	01 SEQ	10 & 10	
		4. ERG, VEP, EOG and Ophthalmic LASER	10 MCQ	01 SEQ	10 & 10	
		5. Applied Statistics, Research Methodology & Project	10 MCQ	01 SEQ	10 & 10	
	Paper II	1. Perimetery	10 MCQ	01 SEQ	10 & 10	
		2. OCT and HRT	10 MCQ	01 SEQ	10 & 10	
		3. Review of biomedical engineering & Optics	10 MCQ	01 SEQ	10 & 10	100
		4. B. Scan	10 MCQ	01 SEQ	10 & 10	
		5. Eye Banking	05 MCQ	0.5 SEQ	05 & 05	
		6. Advanced Inclusive Eye Health	05 MCQ	0.5 SEQ	05 & 05	
	Oral & Practical Examination	1. Ophthalmic photography & fluorescein angiography	Demonstration / Viva Voice		30	200
		2. Biometry			40	
		3. ERG, VEP, EOG and Ophthalmic LASER			20	
		4. Perimetery			40	
		5. OCT and HRT			30	
		6. Optics of Instruments			20	
		7. B. Scan			20	
	Internal Assessment	80 Marks for internal assessments & 20 Marks for Logbook.				100
Total Marks for Fourth Professional Examination = 500						

CURRICULUM PREPARED BY

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Recommended for approval

PROF. DR. ASAD ASLAM KHAN *(Sitara-e-Imtiaz)* ----------
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