अटल बिहारी वाजपेयी मेडिकल यूनिवर्सिटी उत्तर प्रदेश
Atal Bihari Vajpayee Medical University Uttar Pradesh

Ordinance & Curriculum

Of

Bachelor of Optometry (B.Optom)

(In accordance with the "**Model Curriculum of Optometry**" circulated by Allied Health Section, Ministry of Health and Family Welfare, Govt. of India)

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Background of the Optometry profession

An estimated 456 million people of India's population of 1.12 billion people require vision correction (spectacles, contact lenses or refractive surgery) to be able to see and function for learning, work and life in general. Twenty six million people are blind or vision impaired due to eye disease. A further 133 million people, including 11 million children, are blind or vision impaired simply from lack of an eye examination and an appropriate pair of glasses (uncorrected refractive error).

Blindness and vision impairment place a significant economic burden on families, communities and society at large – due to lost productivity, as well as the cost of education and rehabilitation. About 85% of all vision impairment and 75% of blindness globally could be avoided, prevented orcured if the appropriately trained personnel and care facilities existed. The World Health Organisation (WHO) and the International Agency for the Prevention of Blindness (IAPB) launched the global initiative VISION 2020: the Right to Sight to eliminate avoidable blindness and vision impairment.

Uncorrected refractive error is the major cause of avoidable vision impairment, and the second most common cause of blindness. *"Without appropriate optical correction, millions of children are losing educational opportunities and adults are excluded from productive working lives, with severe economic and social consequences. Individuals and families are pushed into a cycle of deepening poverty because of their inability to see".*

In 2007, an estimated 456 million people of India's population of 1.12 billion people required vision correction (spectacles, contact lenses or surgery) to be able to see and function for learning, work and general life activities. This included 37 million children younger than 16 years of age. Almost all of these 456 million adults and children would have normal vision if they had access to an eye examination and an appropriate pair of spectacles. However, lack of access has left 133 million of them, including 11 million children, blind or vision impaired from uncorrected refractive error.

The burden of avoidable blindness and vision impairment on the health care system in India is significant, with India currently having the highest number of blind people in the world. The direct and indirect cost, including lost productivity, due to uncorrected refractive error in India has been estimated at $23 billion per year (I$269 billion globally). As the population ages, future demand for eye care services will increase substantially. Enhancing access to these services will require an increase in the number of eye care professionals, as well as more efficient utilization of existing professionals.

Optometry is recognized by the World Health Organization (WHO) as an independent profession through its ongoing official relations with the World Council of Optometry (WCO) – the international optometric organization which represents almost 300,000 optometrists from 87 member organizations in 47 countries.

Optometry as a profession has the primary public health responsibility for eliminating uncorrected refractive error. To provide excellent vision care to all the people of the country, India needs 116,000 optometrists. India currently has approximately 9,000 4-year trained optometrists and an estimated 30,000 2-year trained eye care personnel.

About Optometry

Optometry means a health care profession that is autonomous and concerned especially with examining the eye for defects and faults of refraction, with prescribing correctional lenses, eye exercises and/or visual rehabilitation care for visually impaired, with diagnosing diseases of the eye,and with treating such diseases or referring them for treatment.

Optometry as a profession has the primary public health responsibility for eliminating uncorrected refractive error (the leading cause of vision impairment globally). As primary eye care practitioners, optometrists have a vital role in detecting potentially serious eye diseases such as cataract, glaucoma and Diabetic retinopathy, age-related maculopathy, as well as general health conditions such as hypertension and diabetes, which means optometrists can also help alleviate the burden of other causes of blindness through diagnosis, referral and in some cases co-management. Optometry can and should play a leading role in eye care provision at the primary level, and can also assist at secondary and tertiary levels where possible, working with ophthalmologists and other eye care providers towards the unified goal of combating blindness.

Nomenclature based on career progression for Optometrist (as per UGC/ UP State AHC)

Levels	Nomenclature in various sectors			Qualification and experience
	Clinical	**Academic**	**Industry/ Management**	
Level 4	Ophthalmic Assistant			• Diploma with 0 - 5 years' experience post Diploma
Level 5	Junior optometrist	Clinical Instructor	Optometrist / Junior Manager	• B. Optom (or equivalent) .With more than 5 years of experience based on the performance of the individual as evaluated by the head of the department, promotion to the next one level possible.
Level 6	Consultant Optometrist	Assistant Professor 1	Skill development officer/Manager	• M. Optom /M Sc optom/ MPhil Optom/Equivalent (0-2 years experience)
Level 7	Senior consultant Optometrist	Assistant Professor 2	Project officer/Manager	• M. Optom/M Sc optom/ MPhil Optom/Equivalent (3-6 years' experience)
Level 8	Chief consultant Optometrist	Associate Professor	Project Manager/Chief Optometry Manager	• M Optom/M Sc optom/ MPhil Optom/Equivalent (7- 10 years experience, PhD desirable/not mandatory)
Level 9	Associate Director	Professor	Senior Project Manager	• M Optom/M Sc optom/ MPhil Optom /Equivalent (11-14 years experience, with PhD desirable not mandatory)*
Level 10	Director	Principal/ Dean/ Director	Director	• M. Optom/M Sc optom/ M Phil Optom/Equivalent (15 years or more of experience) with PhD *

Note: Clinical cadre needs clinical experience, academic needs teaching/ research experience and industry can have either clinical/ teaching experience with managerial skills based on the need.

** In absence of PhD or desirable experience post qualifications specified, the rules can be relaxed for initial 10 years. On Job upgradation of degree may be considered as mandatory till the profession has enough numbers to fulfil the requirements. M.Optom/Equivalent will still remain to be mandatory requirement for academic positions.*

According to International standard classification of Occupations (ISCO -08, Volume-I, International Labour Office, Geneva, 2012, Page 13,14), Optometry is classified under occupations (Major Group : Professionals(2); Sub Major Group : Health Professionals(22); Minor Group : Other Health professionals (226) ; Unit Group : Optometrist (ISC code-2267)) at Skill

Level4 typically involving the performance of tasks that require complex problem-solving, decision making and creatively based on an extensive body of theoretical and factual knowledge in a specialised field.

Such skill are usually obtained as the result of study at a higher educational institution for a period of 3-6 years leading to the award of a first degree or higher qualification (ISCED-97 Level 5 or higher)

Teaching faculty, staff and infrastructure

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure (College & Hospital) and the teaching staff must be adequate and as per the latest norms of the UP State Allied & Healthcare Council.

Teaching areas should facilitate different teaching methods. Where students may share didactic lectures with other disciplines large lecture theatres may be appropriate, but smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches. In all venues where students are placed the health and safety standards must be adhered to.

It is recommended that a faculty and student ratio of **1:10** to be followed in clinical training and practical. The teaching load and pay-scales as well as leave rules will be based on the latest UGC norms for the designated post. The promotion avenues for each designation will be purely based on latest UGC CAS (Career Advancement Scheme) norms.

For 60 seats intake:

S.No.	Designation of the faculty Position	No. of Faculty
1	Principal/ Dean/ Director	01
2	Professor	04
3	Associate Professor	07
4	Assistant Professor	12
	Total	24

The required non-teaching (Technical & Administrative) staff shall be as per the latest norms of the UGC/ UP State Allied & Healthcare Council.

Job availability

As per ILO documentation, employers worldwide are looking for job applicants who not only have technical skills that can be applied in the workplace, but who also can communicate effectively, including with customers; can work in teams, with good interpersonal skills; can solve problems; have good ICT skills; are willing and able to learn; and are flexible in their approach to work. Graduates can expect to be employed in hospitals and private practices as Optometrist. A career in research, following the completion of a higher degree such as a PhD, is an option chosen by some graduates. Also, graduates are eligible for employment overseas where their qualifications, training and experience are highly regarded. With further experience, graduates may also be employed by equipment manufacturers and development specialists.

Graduates have good employment prospects, and will enter a field in which the demand for professionals has increased in recent years and will keep on increasing due to chronic conditions.

Job Opportunities:

The job sectors for optometrist can be divided into the following areas:

1. Corporate sector
2. Private practice
3. Work for an optical chain or under an optical store
4. Public health
5. Industries/companies
6. Eye care hospitals & institutions
7. Education sector
8. Scientific research
9. Basic research and integrated professional areas

Corporate Sector:

Optometrists are employed as professional service people under various lens manufacturing companies as well as contact lens companies. Some pharmaceuticals and surgical instrument companies (eye related) also employ them. Depending on performance there is a career path for the professional service staff and some optometrist have also risen to regional heads (Asia-pacific head).

Private practice:

Optometrist upon graduation can open their optometry clinic with/without optical store. Currently many optometrists are practicing in their own clinic.

Work for optical chain:

The work environment and the responsibilities for working in a chain would be similar to that of a private practitioner.

Public Health:

Optometrist can also enter into the public health domain as health care providers. They could be involved in epidemiological studies, in primary health centres (PHC) and in SHC. Optometrists can collaborate with NGO in service delivery of health care.

Industries/ Companies:

Optometrist can involve in pre-employment vision screening, periodic eye check-up for employees,set vision standards for various occupations, help in occupational health professional in developing eye safety policy of the company, advise on appropriate eye safety wear and can do awareness campaign among the employees especially on the usage of eye safety wear and protection.

Eye Care Hospitals & Institutions:

Optometrists can provide vision care services like prescribing glasses, contact lens, provide comprehensive low vision care services, advice on vision therapy etc. They can also provide extended role in various eye clinics like managing diagnostic services and co-manage patients in an eye care institutional set up or a hospital set up. Optometrist also acts as clinical trainer, researchers, administrators and clinical heads.

Educational Sector:

Optometrists can be employed as faculty depending on experience and qualification. Optometrists also can head optometry schools or college. Academics can also be combined with clinical practice.

Research:

Research areas in optometry are quiet vast ranging from optics, contact lenses, binocular vision, glaucoma, retinal diagnostics, public health, low vision to primary eye and health care. Optometrists can involve themselves in vision science researches, not restricted with any specific areas.

Translational research:

Vision scientists/ optometrists with higher degree can involve in transformational research wherein the scientific discoveries arises from laboratory, clinical or population studies lead into clinical applications to reduce disease incidence, morbidity and mortality.

Bachelor of Optometry

Bachelor of Optometry

Introduction:

Learning Objectives: At the completion of this course, the student should -

1. Be able to develop skills to provide comprehensive eye examination
    a. To acquire knowledge on ocular structures, its functions and pathological changes
    b. To carryout ophthalmic investigations
    c. To impart knowledge with regard to common eye diseases
    d. To impart knowledge on treatment modalities from the perspective of counselling
    e. To acquire knowledge about the referral guidelines for ocular and systemic conditions
2. Be able to correct refractive error and provide spectacle prescription
3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
4. Be able to assess the low vision and provide comprehensive low vision care
5. Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
6. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery
7. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
8. Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
9. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
10. Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
11. Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

Expectation from the future graduates in the providing patient care.

1. Optometrist will work independently or in conjunction with other eye/health care professionals.
2. The optometrist will be knowledgeable, skilful and analytical in diagnosis, treatment planning, management of visual defects & impairments and in co-managements of ocular conditions.
3. The optometrist can work in hospitals (both private and public sectors), optical outlets and/or work as independent practitioner
4. The course will lead to a basic degree in optometry, which is considered as the minimum essential for statutory registration of optometrists in countries where optometry has been brought under legislation.
5. Undertake public health optometry projects and vision screening eye camps in schools, colleges, urban slums, rural areas and also practice occupational optometry in industries.
6. Public education on ocular hygiene and related nutritional and environmental counselling.
7. Offer a helping hand and or efficiently manage and successfully run any ophthalmic clinic, optometry department in hospitals, optical shops, and offer product expertise in ophthalmic industry & trade.

Eligibility for admission:

Selection procedure:

1. He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (45%) in physics, chemistry, biology/mathematics (PCB or PCM).

OR

Diploma in Optometry after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 45% marks in physics, chemistry and biology/mathematics provided the candidate has passed in each subject separately.

2. Candidates who have passed the Senior Secondary school Examination of National Open School with a minimum of 5 subjects with any of the following group subjects.
    a. English, Physics, Chemistry, Botany, Zoology
    b. English, Physics, Chemistry, Biology/Mathematics and any other language
3. He/she has attained the age of 17 years as on 31st December of the year of admission.
4. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.
5. Admission to Bachelor in Optometry course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose.

Duration of the course

The B Optom undergraduate degree program is of four years duration (3+1) including one year of compulsory internship.

Duration of the course: 4 (3+1) years or 8 (6+2) semesters.

Total hours –3675 [(3075 in didactics+ practical +internship) + (300 additional hours to be spent onresearch project) + (300 hours additional hours to be spent on community work)]

Semesters - An academic year consists of two semesters

Odd Semester: July to December

Even Semester: January to June

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate has to secure minimum-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

Assessment & Examination:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated.

At the end of each semester, there shall be University examination.

The passing marks for every course is 50 % marks (internal & University exam taken together) in theory and practical separately.

Grace Marks:

If a candidate fails in one subject (theory only) in the University examination, five grace marks will be given to the candidate by the University before the declaration of result.

Carry forward of Marks:

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified, then he/she shall reappear for the end semester examination of that course. However, his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

Promotion Policy:

A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.

A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.

A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of all the semesters are successfully completed.

Maximum duration of the Program:

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they will be discharged from the said program.

Competency Standards

Classification Units of Competency Skills at Entry level for optometrists

1. Communication Skills
2. Professional Conduct
3. Patient Examination and management.
4. Optical Dispensing
5. Documentation

Credit details:

1 hour lecture/tutorial (L) per week	1 credit
2 hours of laboratory/practical (T/P) per week	1 credit
2 hours of clinics (C) per week	1 credit
2 hours of Research project per week	1 credit

In a semester: 15 weeks.

For example,

1 credit course = 15 hours of lectures per semester

3 credits course = 45 hours of lectures per semester

0.5 credit course = 15 hours of laboratory/practical per semester

Curriculum Outline

First Semester

Sl. No.	Course Titles	Credits/Weeks			Hours/semester			IA* (Marks)	UE** Theory (Marks)	Practical/ VivaVoce** (Marks)	Total (IA+ UE) (Marks)
		L	P	Total	L	T/P	Total				
BOP101	General Anatomy	2	0.5	2.5	30	15	45	50	50	-	**100**
BOP102	General Physiology	2	0.5	2.5	30	15	45	30	50	20	**100**
BOP103	General Biochemistry	2	0.5	2.5	30	15	45	50	50	-	**100**
BOP104	Geometrical Optics-I	3	0.5	3.5	45	15	60	30	50	20	**100**
BOP105	Nutrition	1	-	1	15	-	15	50	50	-	**100**
BOP106	English and Communication	1	-	1	15	-	15	100	-	-	**100**
TOTAL		**11**	**2**	**13**	**165**	**60**	**225**	**310**	**250**	**40**	**600**

***IA –Internal Assessment (Theory + Practical) ** UE- University Examinations (Theory)/(Practicals)**

Teaching resources (tutors) should be made available at every institute for basic subjects such as –Remedial Biology, Remedial Mathematics and Remedial English for students who wish to undertake the extra classes for the same.

Second Semester

Sl. No.	Course Titles	Credits/weeks			Hours per semester			IA* (Marks)	UE** (Marks)	Practical/ VivaVoce** (Marks)	Total (IA+ UE) (Marks)
		L	P	Total	L	T/P	Total				
BOP201	Ocular Anatomy	3	0.5	3.5	45	15	60	50	50	-	**100**
BOP202	Ocular Physiology	3	0.5	4	45	15	60	30	50	20	**100**
BOP203	Ocular Biochemistry	1	0.5	1.5	15	15	30	30	50	20	**100**
BOP204	Physical Optics	3	0.5	3.5	45	15	60	30	50	20	**100**
BOP205	Geometrical Optics-II	3	0.5	3.5	45	15	60	30	50	20	**100**
BOP206	Basics of Computers	-	0.5	0.5	-	15	15	100	-	-	**100**
BOP207	Clinical Optometry-I	-	0.5	0.5	-	15	15	-	-	100	**100**
TOTAL		**13**	**3.5**	**17**	**195**	**105**	**300**	**270**	**250**	**180**	**700**

Note: Clinical postings can be encouraged on Saturdays too.

Third Semester

Sl. No.	Course Titles	Credits /weeks			Hours per Semester			IA* (Marks)	UE** Theory (Marks)	Practical/ VivaVoce** (Marks)	Total (IA+UE) (Marks)
		L	P	C	L	T/P	Total				
BOP301	Ocular Microbiology	1	-	1	15	-	15	50	50	-	100
BOP302	Visual optics –I	1	-	1	15	-	15	50	50	-	100
BOP303	Optometric optics-I	3	-	3	45	-	45	50	50	-	100
BOP304	Optometric Instruments	2	-	2	30	-	30	50	50	-	100
BOP305	Ocular Disease –I	3	-	3	45	-	45	50	50	-	100
BOP306	Clinical examination of visual system	2	-	2	30	-	30	50	50	-	100
BOP307	Indian Medicine and Telemedicine	1	-	1	15	-	15	100	-	-	100
BOP308	Clinical Optometry-II	-	3	3	0	45	45	50	-	50	100
TOTAL		13	3	16	195	45	240	450	300	50	800

Note: Clinical postings can be encouraged on Saturdays too.

Fourth Semester

Sl. No.	Course Titles	Credits /weeks			Hours per semester			IA* (Marks)	UE** Theory (Marks)	Practical/ VivaVoce** (Marks)	Total (IA+UE) (Marks)
		L	P	Total	L	T/ P	Total				
BOP401	Optometric optics – II & Dispensing Optics	3	-	3	45	-	45	50	50	-	100
BOP402	Visual Optics- II	2		2	30	-	30	100	-	-	100
BOP403	Ocular Disease –II and glaucoma	3	-	3	45	-	45	50	50	-	100
BOP404	Pathology	1	-	1	15	-	15	50	50	-	100
BOP405	Basic and Ocular Pharmacology	3	-	3	45	-	45	50	50	-	100
BOP406	Introduction to Quality & Patient safety	2	-	2	30	-	30	100	-	-	100
BOP407	Medical Psychology	1	-	1	15	-	15	50	50	-	100
BOP408	Clinical optometry-III	-	3	3	-	45	45	50	-	50	100
TOTAL		15	3	18	225	45	270	500	250	50	800

Note: Clinical postings can be encouraged on Saturdays too.

Fifth Semester

Sl. No.	Course Titles	Credits /weeks			Hours per Semester			IA* (Marks)	UE** (Marks)	Practical/ VivaVoce (Marks)	Total (IA+ UE) (Marks)
		L	P	Total	L	T/P	Total				
BOP501	Contact lens –I	2	1	3	30	30	60	30	50	20	100
BOP502	Low Vision care	1	0.5	1.5	15	15	30	30	50	20	100
BOP503	Geriatric Optometry & Pediatric Optometry	3	-	3	45	-	45	50	50	-	100
BOP504	Binocular Vision- I	2	-	2	30	-	30	50	50	-	100
BOP505	Systemic Disease	3	-	3	45	-	45	50	50	-	100
BOP506	Research Methodology & Biostatistics	2	-	2	30	-	30	50	50	-	100
BOP507	Clinical Optometry IV	-	3	3	-	45	45	50	-	50	100
TOTAL		13	4.5	17.5	195	90	285	310	300	90	700

Note: Clinical postings can be encouraged on Saturdays too.

Sixth Semester

Sl. No.	Course Titles	Credits /weeks			Hours per semester			IA* (Marks)	UE** (Marks)	Practical/ VivaVoce** (Marks)	Total (IA+ UE) (Marks)
		L	P	Total	L	T/P	Total				
BOP601	Contact Lens –II	2	1	3	30	30	60	30	50	20	100
BOP602	Binocular Vision –II	2	0.5	2.5	30	15	45	30	50	20	100
BOP603	Public Health & Community Optometry	2	-	2	30	-	30	50	50	-	100
BOP604	Practice Management	1	-	1	15	-	15	50	50	-	100
BOP605	Occupational optometry	1	-	1	15	-	15	50	50	-	100
BOP606	Optometry Law and Ethics	1	-	1	15	-	15	50	50	-	100
BOP607	Research Project - I	-	-	2	-	30	30	100	-	-	100
BOP608	Clinical Optometry-V	-	3	3	-	45	45	50	-	50	100
TOTAL		9	4.5	15.5	135	120	255	410	300	90	800

Note: Clinical postings can be encouraged on Saturdays too.

Seventh and Eighth Semester

Sl. No.	Course Titles	Credits /week			Hours per Semester			IA* (Marks)	UE** (Marks)	Practical/ VivaVoce (Marks)	Total (IA+ UE) (Marks)
		L/T	P/C /RP	Total	L/T	C/P /RP	Total				
BOP701	B Optom Internship	2	20	22	30	720	750	50	-	50	**100**
BOP801	B Optom Internship	2	20	22	30	720	750	50	-	50	**100**
BOP802	Research Project - II	0	4	4	-	-	150	100	-	-	**100**
BOP803	Research Project -III	0	4	4	-	-	150	100	-	-	**100**
		4	48	52	60	1440	1800	300	-	100	**400**

Internship is for 12 months (July – December; January – June) or 1 year.

Total number of days (afterdeducting for national holidays & Sundays + Examination): 250 days (6 days /week; 6 hours/ day) = 1500 hours or minimum of 18 weeks /semester (216 days).

Students are encouraged to involve in community outreach activities as part of their clinical postings without absenting himself /herself for the other regular classes.
Project report (thesis) needs to be submitted at the end of internship

DIVISION:
• Candidate will be awarded division at the end of fourth academic year as follows:
- Distinction - 75% and above marks in any subject.
- First division - 60% and above in the aggregate of marks of all subjects.
- Second division- 50% or more but less than 60% in the aggregate of marks of all subjects.

DEGREE:
• The degree of B.Optom program of the University shall be conferred on the candidates who have pursued the prescribed course of study for not less than four years (including 1 year internship) and have passed examinations as prescribed under the relevant scheme.

First Semester

GENERAL ANATOMY

INSTRUCTOR IN CHARGE: Anatomist with at least Master's Degree.

COURSE DESCRIPTION: General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous system in particular.

OBJECTIVES: At the end of the semester, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2. Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

TEXT BOOKS:-

1. MARIANO S.H. DIFIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger.
2. G.J. TORTORA & N.P ANAGNOSTAKOS: Principles of Anatomy and Physiology. (recent edition)
3. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi.

REFERENCE BOOKS:-

1. PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy – Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
2. T.S. RANGANATHAN: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.
3. INDERBIR SINGH: Human Embryology, 3rd Ed., Macmillan India, 1981.
4. R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

	Sl. No.	Topics	No. of hrs.
Unit-1	1	Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system	1
	2	Skeleton System	3
	3	Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in	3

	Sl. No.	Topics	No. of hrs.
		different tissues	
Unit-2	4	Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply	3
	5	Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations	3
Unit-3	6	Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves	3
	7	Lymphatic system: Embryology, functions, relationship with blood vessels and organs	1
Unit-4	8	Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands	2
	9	Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system	5
Unit-5	10	Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves	6
		Total Number of Hours	**30**

PRACTICAL (15 Hours): Practical demonstration of each organ using specimen. If specimen for certain organs are not available, then videos can be shown to make the student understand the anatomic structures.

GENERAL PHYSIOLOGY
INSTRUCTOR IN CHARGE: Physiologist with at least Master's Degree

COURSE DESCRIPTION: General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neuro physiology.

OBJECTIVES: At the end of the course the student will be able to: • Explain the normal functioning of various organ systems of the body and their interactions. • Elucidate the physiological aspects of normal growth and development. • Describe the physiological response and adaptations to environmental stresses. • Know the physiological principles underlying pathogenesis of disease.

TEXT BOOKS:-

1. L Prakasam reddy, Fundamentals of Medical Physiology, 4th Edition, Paras medical Publisher, Hyderabad, 2008
2. Sujit K. Chaudhuri, Concise Medical Physiology, 6th edition, New Central Book Agency, Kolkata, 2008

REFERENCE BOOKS:-

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition,CBS Publishers, New Delhi, 2006
2. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,
3. G J Tortora, B Derrickson: Principles of anatomy & physiology,11th edition, Harper & Row Publishers, New York
4. John Wiley & Sons Inc, New Jersey, 2007

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

Unit-1

Sl. No.	Topics	No. of hrs.
1	CELL STRUCTURE & ORGANIZATION Tissue organization Epithelium Connective tissue –Collagen fibers –Elastic fibers –Areolar fibers Cartilage –Bone Contractile tissue –striated –skeletal –cardiac –non striated –plain –myoepithelial General principles of cell physiology Physiology of skeletal muscle	4
2	BLOOD: Composition Volume measurement & variations Plasma proteins –classification & functions Red blood cells –development, morphology & measurements –functions & dysfunctions. White blood cells –development –classification, morphology –functions & dysfunctions Platelets –morphology –development, functions & dysfunctions Clotting –factors –mechanism –anti- coagulants dysfunctions Blood grouping –classification –importance in transfusion, Rh factor & incompatibility Suspension stability Osmotic stability Reticulo endothelial system o Spleen o lymphatic tissue o Thymus o bone marrow o immune system o cellular o Humoral o Autoimmune	4

Sl. No.	Topics	No. of hrs.

	Sl. No.	Topics	No. of hrs.
Unit-2	3	DIGESTION: General arrangement Salivary digestion –functions & regulations Gastric digestion –functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile Absorption Motility Deglutition Vomiting Defecation Functions of large intestine Neurohumoral regulations of alimentary functions, summary	2
	4	EXCRETION: Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition	2
Unit-3	5	ENDOCRINES: Hormone mechanism –negative feed backs –tropic action –permissive action – cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla –hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas –hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders	3
	6	REPRODUCTION: Male reproductive system –control & regulation Female reproductive system –uterus –ovaries –menstrual cycle –regulation – pregnancy & delivery –breast –family planning	1
	7	RESPIRATION: Mechanics of respiration –pulmonary function tests –transport of respiratory gases-neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea– asphyxia.	1
Unit-4	8	CIRCULATION: General principles Heart: myocardium –innervation –transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure –measurements –factors regulation variations –capillary circulation – venous circulation. Special circulation: coronary cerebral –miscellaneous	4
Unit-5	9	ENVIRONMENTAL PHYSIOLOGY Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure	2

Unit-5	10	NERVOUS SYSTEM: Neuron –Conduction of impulse –synapse –receptor. Sensory organization –pathways and perception Reflexes –cerebral cortex –functions. Thalamus –Basal ganglia Cerebellum. Hypothalamus. Autonomic nervous system –motor control of movements, posture and equilibrium – conditioned reflex, eye hand co-ordination	5
	11	SPECIAL SENSES –(Elementary) Olfaction –Taste –Hearing	2
		Total Number of Hours	**30**

PRACTICAL (Total: 15 hours)

1. Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time
2. Digestion: Test salivary digestions
3. Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts
4. Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders.
5. Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test
6. Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate
7. Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes

GENERAL BIOCHEMISTRY

INSTRUCTOR IN CHARGE: Biochemist with at least Master's Degree

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

OBJECTIVES: At the end of the course, the student should be able to: demonstrate his knowledge and understanding on:

1. Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
2. Integration of the various aspects of metabolism, and their regulatory pathways.
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

TEXT BOOK: S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

REFERENCE BOOKS:

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D.R. Whikehart: Biochemistry of the Eye, 2ndedition, Butterworth Heinemann, Pennsylvania, 2003

PREREQUISITES: Higher secondary level chemistry with good knowledge of organic chemistry.

COURSE PLAN

	Sl.No.	Topics	No of hrs
Unit-1	1	Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)	6
Unit-2	2	Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)	6
Unit-3	3	Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacyglycerol, phospholipids and plasma membrane	6
Unit-4	4	Vitamins: General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties)	6
Unit-5	5	Minerals: Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)	6
		Total Number of Hours	**30**

PRACTICAL (Total: 15 hours)

1. Reactions of monosaccharides, disaccharides and starch:

Glucose	Fructose
Galactose	Maltose, lactose
Sucrose	Starch

2. Analysis of Unknown Sugars

Estimation:

Photometry	Biofluid of choice – blood, plasma, serum
Standard graphs	Glucose
Proteins	Urea
Creatinine	Bilirubin

GEOMETRICAL OPTICS-I

INSTRUCTOR IN CHARGE: A post-graduate, preferably a Ph D, in physics OR An optometrist with a post-graduate degree, preferably a Ph D.

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

OBJECTIVES: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

TEXT BOOK:

1. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
2. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

REFERENCE BOOKS:

1. Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN

	No.	Topics	No of hrs.
Unit-1	1.	Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index.	2
	2.	Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance	2
	3.	Refractive index; its dependence on wavelength	1
	4.	Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles	3
	5.	Plane mirrors –height of the mirror; rotation of the mirror	1
Unit-2	6.	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation	1
	7.	Imaging by concave mirror, convex mirror	2
	8.	Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface	2

	No.	Topics	No of hrs.
	9.	Glass slab; displacement without deviation; displacement without dispersion	2
	10.	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism	2
	11.	Prisms; angular dispersion; dispersive power; Abbe's number.	1
	12.	Definition of crown and flint glasses; materials of high refractive index	1
Unit-3	13.	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index	2
	14.	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula	3
	15.	Paraxial approximation; derivation of vergence equation	1
	16.	Imaging by a positive powered surface and negative powered surface	1
	17.	Vergence at a distance formula; effectivity of a refracting surface	1
	18.	Definition of a lens as a combination of two surfaces; different types of lens shapes.	1
Unit-4	19.	Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths	3
	20.	Newton's formula; linear magnification; angular magnification	2
	21.	Nodal Planes	1
	22.	Thin lens as a special case of thick lens; review of sign convention	1
	23.	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
Unit-5	24.	Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
	25.	Prentice's Rule	1
	26.	System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points.	2
	27.	System of more than two thin lenses; calculation of equivalent power using magnification formula	2
		Total number of Lectures	**45**

PRACTICAL (Total: 15 hours)

1. Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
2. Thin Prism – measurement of deviation; calculation of the prism diopter
3. Image formation by spherical mirrors
4. Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
5. Concave lens – in combination with a convex lens – power determination.

NUTRITION

INSTRUCTOR IN CHARGE: Nutritionist with Masters/ Doctorate

COURSE DESCRIPTION: This course covers the basic aspects of Nutrition for good health. It also includes nutrients and nutrient derivatives relevant to ocular health, nutrition deficiency and ocular disease, Nutrition and ocular aging, and contraindications, adverse reactions and ocular nutritional supplements.

OBJECTIVES: At the end of the course student would have gained the knowledge of the following: • Balanced diet. • Protein, carbohydrates, vitamins, Minerals, carotenoids and eye. • Nutrition and Ocular aging • Adverse effects of ocular nutritional supplements.

TEXT BOOK:

1. M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004
2. C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad,2004
3. Frank Eperjesi & Stephen Beatty: Nutrition and the Eye A practical Approach, Elsevier Butterworth- Heinemann, USA, 2006

REFERENCE BOOKS: No recommendation. It is left to the faculty.
PREREQUISITES: Nil
COURSE PLAN (Total: 15 hours)

Unit-1	1. Introduction. History of Nutrition Nutrition as a science Food groups, RDA Balanced diet, diet planning. Assessment of nutritional status
	2. Energy Units of energy. Measurements of energy and value of food Energy expenditure. Total energy/calorie requirement for different age groups and diseases. Satiety value Energy imbalance- obesity, starvation. Limitations of the daily food guide.
Unit-2	3. Proteins Sources and functions Essential and non- essential amino- acids. Incomplete and complete proteins Supplementary foods. PEM and the eye Nitrogen balance Changes in protein requirement.
Unit-3	4. Fats Sources and functions Essential fatty acids Excess and deficiency Lipids and the eye. Hyperlipidemia, heart diseases, atherosclerosis.
Unit-4	5. Minerals General functions and sources Macro and micro minerals associated with the eye. Deficiencies and excess –ophthalmic complications (e.g. iron, calcium, iodine etc.)

	6. Vitamins General functions, and food sources Vitamin deficiencies and associated eye disorders with particular emphasis to VitaminA Promoting sound habits in pregnancy, lactation and infancy. Nutrient with antioxidant. Properties Digestion of Proteins, carbohydrates & lipids
Unit-5	7. Essential amino acids. 8. Miscellaneous Measles and associated eye disorders, low birth weight

ENGLISH AND COMMUNICATION
INSTRUCTOR IN CHARGE Masters in English preferable.

COURSE DESCRIPTION: This course deals with essential functional English aspects and nuances of the communication skills essential for the health care professionals.
OBJECTIVES:

1. This course trains the students in oral presentations, expository writing, logical organization and structural support.
2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.

TEXT BOOK:

1. Graham Lock, Functional English Grammar: Introduction to second Language Teachers. Cambridge University Press, New York, 1996.
2. Gwen Van Servellen. Communication for Health care professionals: Concepts, practice and evidence, Jones & Bartlett Publications , USA, 2009

REFERENCE BOOKS: Faculty may decide.
PREREQUISITES: Basic English equivalent to 10th standard of the study.
COURSE PLAN

Functional English	**Topics**	**Hours**
Unit 1 Basics of Grammar	Vocabulary Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	2
Unit II Basics of Grammar – Part II	Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	1
Functional English	**Topics**	**Hours**
Unit III Writing Skills	Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension	2
Unit IV Writing and Reading	Summary writing, Creative writing, newspaper reading	1
Unit V Practical Exercise	Formal speech, Phonetics, semantics and pronunciation	1
Communication		

Introduction	• Communication process. • Elements of communication • Barriers of communication and how to overcome them. • Nuances for communicating with patients and their attenders in hospitals	1
Speaking	• Importance of speaking efficiently • Voice culture. • Preparation of speech. Secrets of good delivery • Audience psychology, handling • Presentation skills. • Individual feedback for each student • Conference/Interview technique	2
Listening	• Importance of listening • Self-assessment • Action plan execution. • Barriers in listening. • Good and persuasive listening	2
Reading	• What is efficient and fast reading • Awareness of existing reading habits • Tested techniques for improving speed • Improving concentration and comprehension through systematic study.	1
Non Verbal Communication	• Basics of non-verbal communication • Rapport building skills using neuro- linguistic programming (NLP)	1
Communication in Optometry practice		1
Total		**15**

Second Semester

OCULAR ANATOMY

INSTRUCTOR IN CHARGE: Anatomist, Optometrist or Ophthalmologist with PG qualification.

COURSE DESCRIPTION: This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

OBJECTIVES: At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
4. To understand the basic principles of ocular embryology.

TEXT BOOK: L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

REFERENCE BOOKS: AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Latest

edition, CBS Publishers, New Delhi.

PREREQUISITES: General anatomy.

COURSE PLAN (Total: 45 hours)

Unit-1	1. Central nervous system: Spinal cord and brain stem Cerebellum Cerebrum.
Unit-2	2. Orbit Eye Sclera Cornea Choroid Ciliary body Iris Retina
Unit-3	3. Refractory media- Aqueous humor Anterior chamber Posterior chamber Lens Vitreous body
Unit-4	4. Eyelids 5. Conjunctiva
Unit-5	6. Embryology

7.

PRACTICAL (Total: 15 hours)

1. Eye: Practical simulation and video based
2. Orbit: Practical demonstration of orbital structures.

OCULAR PHYSIOLOGY

INSTRUCTOR IN CHARGE: Physiologist, Optometrist or Ophthalmologist with PG qualification.

COURSE DESCRIPTION: Ocular physiology deals with the physiological functions of each part of the eye.

OBJECTIVES: At the end of the course, the student should be able to:

1. Explain the normal functioning of all structures of the eye and their interactions
2. Elucidate the physiological aspects of normal growth and development of the eye
3. Understand the phenomenon of vision
4. List the physiological principles underlying pathogenesis and treatment of diseases of the eye

TEXT BOOK: AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Latest edition, CBS Publishers, New Delhi

REFERENCE BOOKS:

1. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
2. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

PREREQUISITES: General Physiology

COURSE PLAN: (Total: 45 hours)

Unit-1	1. Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe
	2. Extrinsic eye muscles, their actions and control of their movements
	3. Coats of the eye ball
	4. Cornea
	5. Aqueous humor and vitreous: Intra ocular pressure
Unit-2	6. Iris and pupil
	7. Crystalline lens and accommodation – presbyopia
	8. Retina – structure and functions
	9. Vision – general aspects of sensation
	10. Pigments of the eye and photochemistry
Unit-3	11. The visual stimulus, refractive errors
	12. Visual acuity, Vernier acuity and principle of measurement
	13. Visual perception – Binocular vision, stereoscopic vision, optical illusions
	14. Visual pathway, central and cerebral connections
	15. Colour vision and colour defects. Theories and diagnostic tests
Unit-4	16. Introduction to electro physiology
	17. Scotopic and Photopic vision
	18. Color vision, Color mixing
	19. Mechanism of accommodation
	20. Retinal sensitivity and Visibility
Unit-5	21. Receptive stimulation and flicker
	22. Ocular, movements and saccades
	23. Visual perception and adaptation
	24. Introduction to visual psychology (Psychophysics)

PRACTICAL: Total: 15 hours.

1. Lid movements
2. Tests for lacrimation tests
3. Extra ocular movements
4. Break up time
5. Pupillary reflexes
6. Applanation tonometry
7. Schiotz tonometry.
8. Measurement of accommodation and convergence
9. Visual acuity measurement.
10. Direct ophthalmoscopy
11. Indirect ophthalmoscopy
12. Retinoscopy
13. Light and dark adaptation.
14. Binocular vision(Stereopsis)

OCULAR BIOCHEMISTRY
INSTRUCTOR IN CHARGE: Masters or Ph D in Biochemistry

COURSE DESCRIPTION: This course is being taught in two consecutive semesters. Ocular

Biochemistry deals with the metabolism that takes place in the human body. It also deals with ocular biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

OBJECTIVES: At the end of the course, the student should be able to demonstrate his knowledge and understanding on

1. Structure ,function and interrelationship of biomolecules and consequences of deviation from the normal
2. Integration of various aspects of metabolism and their regulatory pathways
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data
4. Understand metabolic processes taking place in different ocular structures.

TEXT BOOK: S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

REFERENCE BOOKS:

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

PREREQUISITES: Higher secondary level chemistry with good knowledge of organic chemistry and knowledge of Biochemistry I

COURSE PLAN: (Total: 15 hours)

Unit-1	1. Hormones basic concepts in metabolic regulation with examples say insulin.
Unit-2	2. Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)
Unit-3	3. Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.)Immunology of anterior segment
Unit-4	4. Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.
Unit-5	5. Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation.

PRACTICAL (Total: 15 hours)

1. Quantitative analysis
2. Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.
3. Techniques of detection of abnormal constituents of urine:
4. Electrophoresis
   Chromatography
   Preparation of normal, molar and percentage solutions.
   Preparation of buffers, pH determination
5. Demonstration
   Estimation of blood cholesterol
   Estimation of alkaline phosphatase.
   Salivary amylase (effect of ph, etc)
   Milk analysis.

PHYSICAL OPTICS

INSTRUCTOR IN CHARGE: A post-graduate, preferably a Ph D, in physics OR An optometrist with a post-graduate degree,preferably a Ph D

COURSE DESCRIPTION: This course will be taught in one semester. Physical Optics is the study of light, its properties and its interaction with matter. Specifically, the phenomena of interference, diffraction, polarization and scattering will be dealt with in detail.

OBJECTIVES: The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

TEXT BOOK: Subrahmanyan N, BrijLal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

REFERENCE BOOKS:

1. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
2. Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN

	No.	Topics	No of hrs.
Unit-1	1.	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation;concepts of frequency, wavelength, amplitude and phase.	7
	2.	Sources of light; Electromagnetic Spectrum.	3
	3.	Polarized light; linearly polarized light; and circularly polarized light.	3
Unit-2	4.	Intensity of polarized Lght; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.	2
	5.	Birefringence; ordinary and extraordinary rays.	2
	6.	Relationship between amplitude and intensity.	1
Unit-3	7.	Coherence; interference; constructive interference, destructive interference; fringes; fringe width.	2
	8.	Double slits, multiple slits, gratings.	2
	9.	Diffraction; diffraction by a circular aperture; Airy's disc	2
Unit-4	10.	Resolution of an instrument (telescope, for example); Raleigh's criterion	2
	11.	Scattering; Raleigh's scattering; Tyndall effect.	2
	12.	Fluorescence and Phosphorescence	2
Unit-5	13.	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.	5
	14.	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units	4
	15.	Inverse square law of phctometry; Lambert's law.	3
	16.	Other units of light measurement; retinal illumination; Trolands	3
		Total number of Lectures	**45**

PRACTICAL: Total : 15 hours

Each practical session could be evaluated for 10 marks and the total could be added to the final

evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following:

1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp
2. Circular Apertures – measurements of Airy's disc for apertures of various sizes
3. Verification of Malus' Law using a polarizer – analyzer combination
4. Demonstration of birefringence using Calcite crystals
5. Measurement of the resolving power of telescopes.
6. Newton's rings
7. Demonstration of fluorescence and phosphorescence using crystals and paints

GEOMETRICAL OPTICS II:

INSTRUCTOR IN CHARGE : A post-graduate, preferably a Ph D, in physics OR An optometrist with a post-graduate degree,preferably a Ph D OR An optometrist with an undergraduate degree

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

OBJECTIVES: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

TEXT BOOK:

1. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
2. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

REFERENCE BOOKS:

1. Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN: Total: 45 hours

Unit-1	1. Vergence and vergence techniques revised.
	2. Gullstrand's schematic eyes, visual acuity, Stile Crawford
Unit-2	3. Emmetropia and ametropia
	4. Blur retinal Imaginary
Unit-3	5. Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic
	6. Thin lens model of the eye –angular magnification – spectacle and relative spectacle magnification.
Unit-4	7. Aperture stops- entrance and exit pupils.
	8. Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.
	9. Accommodation –Accommodation formulae and calculations.
Unit-5	10. Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field.
	11. Spatial distribution of optical information- modulation transfer functions- Spatial filtering-applications.
	12. Visual optics of aphakia and pseudophakia.

PRACTICAL: Total: 15 hours

1. Construction of a tabletop telescope – all three types of telescopes.
2. Construction of a tabletop microscope

3. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
4. Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
5. Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

BASIC COMPUTERS AND INFORMATION SCIENCE
INSTRUCTOR IN CHARGE: Graduate in Information and technology or optometrist /administrative staff with adequate computer knowledge and with teaching experience

COURSE DESCRIPTION: The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

OBJECTIVES: The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

COURSE PLAN: (Total: 15 hours) – students will be given hand-on practical sessions and reading materials (softcopy). Some of the topics will be demonstration.

Unit-1	1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
	2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
Unit-2	3. Processor and memory: The Central Processing Unit (CPU), main memory.
	4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
	5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
Unit-3	6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
	7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
	8. Introduction to power-point: introduction, creating

	and manipulating presentation, views,formatting and enhancing text, slide with graphs.
Unit-4	9. Introduction of Operating System: introduction, operating system concepts, types ofperating system.
	10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet,Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
Unit-5	11. Internet and its Applications: definition, brief history, basic services (E-Mail, File TransferProtocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
	12. Application of Computers in clinical settings.

CLINICAL OPTOMETRY I (STUDENTSHIP): Total: 15 hours

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment.

Third Semester

OCULAR MICROBIOLOGY

INSTRUCTOR IN CHARGE: Microbiologist with Masters or Ph D qualification.

COURSE DESCRIPTION This course covers the basic biological, biochemical and pathogenic characteristics of pathogenic organisms.

OBJECTIVES The objectives of the course are:

1. To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
2. To acquire knowledge of the principles of sterilisation and disinfection in hospital and ophthalmic practice;
3. To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections and
4. To understand basic principles of diagnostic ocular Microbiology.

TEXT BOOK:

1. BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
2. M J Pelczar (Jr),ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, New Delhi,1993

REFERENCE BOOKS:

1. KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAW HILL Publisher, New Delhi, 1994 MACKIE & McCartney Practical Medical Microbiology
2. SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM) 5)

PREREQUISITES: Higher secondary Biology

COURSE PLAN: (Total: 15 hours)

Unit-1	1. Morphology and principles of cultivating bacteria
	2. Sterilization and disinfections used in laboratory and hospital practice
Unit-2	3. Common bacterial infections of the eye.
Unit-3	4. Common fungal infections of the eye
Unit-4	5. Common viral infections of the eye.
Unit-5	6. Common parasitic infections of the eye.

VISUAL OPTICS I

INSTRUCTOR IN CHARGE: Optometrist preferably a postgraduate or undergraduate with more than 2 years of teaching experience.

COURSE DESCRIPTION: This course deals with the concept of eye as an optical instrument and thereby covers various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

OBJECTIVES: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

TEXT BOOK:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

REFERENCE BOOKS:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
5. T Grosvenor: Primary Care Optometry,4th edition, Butterworth –heinneman,USA,2002

PREREQUISITES: Geometrical optics, Physical optics, Ocular Physiology

COURSE PLAN (Total: 15 hours)

Unit-1	1. Review of Geometrical Optics: Vergence and power Conjugacy, object space and image space , Sign convention
Unit-2	2. Spherical refracting surface Spherical mirror; catoptric power Cardinal points Magnification Light and visual function Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Brefringence, Dichroism Aberration and application Spherical and Chromatic
Unit-3	3. Optics of Ocular Structure Cornea and aqueous Crystalline lens Vitreous Schematic and reduced eye
Unit-4	2. Measurements of Optical Constants of the Eye Corneal curvature and thickness Keratometry Curvature of the lens and ophthalmophakometry Axial and axis of the eye Basic Aspects of Vision. Visual Acuity Light and Dark Adaptation Color Vision Spatial and Temporal Resolution Science of Measuring visual performance and application to ClinicalOptometry
Unit-5	3. Refractive anomalies and their causes Etiology of refractive anomalies Contributing variability and their ranges Populating distributions of anomalies. Optical component measurements Growth of the eye in relation to refractive errors

OPTOMETRIC OPTICS I
INSTRUCTOR IN CHARGE: Optometrist - B optom / M Optom/ Ph D

COURSE DESCRIPTION: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

OBJECTIVES: Skills/knowledge to be acquired at the end of this course: -

1. Measurement of lens power , lens centration using conventional techniques
2. Transposition of various types of lenses •Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.
5. Method of laying off the lens for glazing process.

6. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
7. Knowledge of prism and decentration in ophthalmic lenses
8. Knowledge of different types of materials used to make lenses and its characteristics
9. Knowledge lens designs –single vision, bifocals, progressive lens
10. Knowledge on tinted and protective lenses
11. Knowledge on special lenses like iseikonic, spectacle magnifiers.
12. Knowledge on spectacle frames –manufacture, materials

TEXT BOOK: Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

REFERENCE BOOKS:

1. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission,1999
2. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

PREREQUISITES: Physical Optics, Geometrical Optics

COURSE PLAN (Total: 45 hours)

Unit-1	1. Introduction –Light, Mirror, Reflection, Refraction and Absorption
	2. Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apexnotation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms
Unit-2	3. Lenses –Definition, units, terminology used to describe, form of lenses
	4. Vertex distance and vertex power, Effectivity calculations
Unit-3	5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
	6. Transpositions –Simple, Toric and Spherical equivalent
Unit-4	7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano- cylinder and Spherocylinderlenses
	8. Spherometer & Sag formula, Edge thickness calculations
Unit-5	9. Magnification in high plus lenses, Minification in high minus lenses
	10. Tilt induced power in spectacles
	11. Aberration in Ophthalmic Lenses

OPTOMETRIC INSTRUMENTS

INSTRUCTOR IN CHARGE: Optometrist with experience in teaching instrument course (B Optom/M Optom/ Ph D)

COURSE DESCRIPTION: This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice.

OBJECTIVES: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Jackson Cross cylinder
5. Direct ophthalmoscope
6. Slit lamp Biomicroscope
7. Slit lamp Ophthalmoscopy (+90, 78 D)
8. Gonioscope
9. Tonometer: Applanation Tonometer
10. Keratometer
11. Perimeter
12. Electrodiagnostic instrument (ERG, VEP, EOG)
13. A –Scan Ultrasound
14. Lensometer

TEXT BOOK: David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK 1991

REFERENCE BOOKS:

1. P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002
2. G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997

PREREQUISITES: Geometrical optics

COURSE PLAN (Total: 30 hours)

Unit-1	1. Refractive instruments Optotypes and MTF, Spatial Frequency Test charts standards. Choice of test charts Trial case lenses Refractor (phoropter) head units Optical considerations of refractor units Trial frame design Near vision difficulties with units and trial frames Retinoscope – types available Adjustment of Retinoscopes- special features Objective optometers. Infrared optometer devices. Projection charts Illumination of the consulting room. Brightness acuity test Vision analyzer Pupilometer Potential Acuity Meter Abberometer
Unit-2	2. Ophthalmoscopes and related devices Design of ophthalmoscopes – illumination Design of ophthalmoscopes- viewing Ophthalmoscope disc Filters for ophthalmoscopy Indirect ophthalmoscope
Unit-3	3. Lensometer, Lens gauges or clock 4. Slit lamp 5. Tonometers 6. Keratometer and corneal topography
Unit-4	7. Refractometer
	8. Orthoptic Instruments (Synaptophore Only)
	9. Color Vision Testing Devices
	10. Fields of Vision And Screening Devices
Unit-5	11. Scans
	12. ERG
	13. New Instruments

OCULAR DISEASES I

INSTRUCTOR IN CHARGE: Ophthalmologist or Optometrist with teaching experience (B Optom/ M Optom/ Ph D)

COURSE DESCRIPTION: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

OBJECTIVES: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases:

1. Etiology
2. Epidemiology
3. Symptoms

4. Signs
5. Course sequelae of ocular disease
6. Diagnostic approach and
7. Management of the ocular diseases.

TEXT BOOK: A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

REFERENCE BOOKS:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Pharmacology

COURSE PLAN (Total: 45 hours)

Unit-1	1. Orbit Applied Anatomy Proptosis (Classification, Causes, Investigations) Enophthalmos Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism,Median facial cleft syndrome) Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis,cavernous sinus Thrombosis) Grave's Ophthalmopathy Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma) Orbital blowout fractures Orbital surgery (Orbitotomy) Orbital tumors Orbital trauma Approach to a patient with proptosis
Unit-2	2. Lids Applied Anatomy Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos) Oedema of the eyelids(Inflammatory, Solid, Passive edema) Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Internal hordeolum, Molluscum Contagiosum) Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis). Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma) 3. Conjunctiva Applied Anatomy Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral ,Allergic conjunctivitis, Granulomatous conjunctivitis)

	Degenerative conditions(Pinguecula, Pterygium, Concretions) Symptomatic conditions(Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration) Cysts and Tumors
Unit-3	4. Lacrimal System Applied Anatomy Tear Film The Dry Eye (Sjogren's Syndrome) The watering eye (Etiology, clinical evaluation) Dacryocystitis Swelling of the Lacrimal gland(Dacryoadenitis)
Unit-4	5. Cornea Applied Anatomy and Physiology Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudycornea) Inflammations of the cornea (Topographical classifications: Ulcerative keratitis andNon ulcerative Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic)) Degenerations (classifications, Arcussenilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration) Dystrophies (Reis Buckler dystrophy,Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy) Keratoconus, Keratoglobus Corneal oedema, Corneal opacity, Corneal vascularisation Penetrating Keratoplasty
Unit-5	6. Uveal Tract and Sclera Applied Anatomy, Classification of uveitis Etiology Pathology Anterior Uveitis Posterior Uveitis Purulent Uveitis Endophthalmitis Panophthalmitis Pars Planitis Tumors of uveal tract(Melanoma) Episcleritis and scleritis Clinical examination of Uveitis and Scleritis

CLINICAL EXAMINATION OF THE VISUAL SYSTEM

INSTRUCTOR IN CHARGE: Optometry professional with B Optom or higher optometry

degree

COURSE DESCRIPTION: This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, paediatric optometry examination, and Glaucoma evaluation.

OBJECTIVES: At the end of the course the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures

TEXT BOOK: T Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinneman, USA, 2007.

REFERENCE BOOKS:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007
2. D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
3. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, Butterworth-Heinemann, 2007
4. J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins,1991
5. N B. Carlson , Dl Kurtz: Clinical Procedures for Ocular Examination ,3rd edition, McGraw-Hill Medical, 2003

PREREQUISITES: Optometric Instruments, Pharmacology

COURSE PLAN (Total: 30 hours)

Unit-1	1. History taking 2. Visual acuity estimation 3. Extraocular motility, Cover teat, Alternating cover test 4. Hirschberg test, Modified Krimsky
Unit-2	5. Pupils Examination 6. Maddox Rod 7. Van Herrick 8. External examination of the eye, Lid Eversion
Unit-3	9. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), 10. Color Vision 11. Stereopsis 12. Confrontation test
Unit-4	13. Photostress test 14. Slit lamp biomicroscopy 15. Ophthalmoscopy 16. Tonometry
Unit-5	17. ROPLAS 18. Amsler test 19. Contrast sensitivity function test 20. Saccades and pursuit test

INDIAN MEDICINE AND TELEMEDICINE

INSTRUCTOR IN CHARGE: Public health professional or optometrist who have knowledge in National health care system.

COURSE DESCRIPTION: This course insight into existing healthcare system in India.

OBJECTIVES: At the end of the course student will be aware of the traditional and the latest healthcare system. The student also will get basic knowledge about the telemedicine practices in India especially in eye care.

TEXT BOOK: Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Joney & Bartlett learning, 2014 (page 167 -178)
REFERENCE BOOKS: Faculty may decide.
COURSE PLAN: (Total: 15 hours)
Topics to be covered under the subject are as follows:

Unit-1	1. Introduction to healthcare delivery system Healthcare delivery system in India at primary, secondary and tertiary care Community participation in healthcare delivery system Health system in developed countries. Private Sector National Health Mission National Health Policy Issues in Health Care Delivery System in India
	1. National Health Programme-Background objectives, action plan, targets, operations,achievements and constraints in various National Heath Programme.
Unit-2	2. Introduction to AYUSH system of medicine Introduction to Ayurveda. Yoga and Naturopathy Unani Siddha Homeopathy Need for integration of various system of medicine
Unit-3	3. Health scenario of India- past, present and future
Unit-4	4. Demography & Vital Statistics- Demography – its concept Vital events of life & its impact on demography Significance and recording of vital statistics Census & its impact on health policy
Unit-5	5. Epidemiology Principles of Epidemiology Natural History of disease Methods of Epidemiological studies Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance

CLINICAL OPTOMETRY II (STUDENTSHIP) Total: 45 hours

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical aspects of the dispensing optics(hand-on in optical), optometric instruments, clinical

examination of visual system(Hands-on under supervision) and ocular diseases (Slides and case discussion) will be given to the students during their clinical training.

Fourth Semester

OPTOMETRIC OPTICS II & Dispensing Optics

OPTOMETRIC OPTICS II

INSTRUCTOR INCHARGE: Optometrist (M.Optom/Ph D). Practicing Optometrists with experience in Optical Dispensing & Optical Laboratory In-charge

COURSE DESCRIPTION: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect. In addition deals with role of optometrists in optical set-up.

OBJECTIVES: Skills/knowledge to be acquired at the end of this course:

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs–Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames –manufacture process & materials
6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counselling the patient
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient's questions

TEXT BOOK/REFERENCE BOOKS:

1. Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
2. Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996
3. C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rdedition, Butterworth - Heinemann, 2007
4. Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Optomteric Optics - I

COURSE PLAN

	Sl. No	Topics	No. of Hrs
Unit-1	1.	Spectacle Lenses - II: • Manufacture of glass • Lens materials • Lens surfacing • Principle of surface generation and glass cements • Terminology used in Lens workshop • Lens properties • Lens quality • Faults in lens material • Faults on lens surface • Methods of Inspecting the quality of lenses • Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others	5
	2.	Spectacle Frames: • Types and parts • Classification of spectacle frames-material, weight, temple position, Coloration • Frame construction • Frame selection • Frame measurements (boxing and datum system) • Size, shape, mounting and field of view of ophthalmic lenses	5
Unit-2	3.	Tinted & Protective Lenses • Characteristics of tinted lenses Absorptive Glasses • Polarizing Filters, Photochromic & Reflecting filters • Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses	5
	4.	Multifocal Lenses: • Introduction, history and development, types of Bifocal lenses, Trifocal & Progressive addition lenses • Progressive lenses : design and optics	3
Unit-3	5.	Reflection from spectacle lens surface & lens coatings: • Reflection from spectacle lenses - ghost images -Reflections in bifocals at the dividing line • Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating	2
	6.	Miscellaneous Spectacle: • Iseikonic lenses • Spectacle magnifiers • Recumbent prisms • Fresnel prism and lenses • Lenticular &Aspherical lenses • High Refractive index glasses	5
		Total number of hours	25

DISPENSING OPTICS:

	Sl. No.	Topic	No. of Lectures
Unit-4	1	Components of spectacle prescription & interpretation, transposition, Add and near power relation	1
	2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape	4
	3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	1
	4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt	1
	5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	1
	6	Neutralization –Hand &lensometer, axis marking, prism marking	3
Unit-5	7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)	2
	8	Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit	2
	9	Spectacle repairs –tools, methods, soldering, riveting, frame adjustments	1
	10	Special types of spectacle frames ➢ Monocles ➢ Ptosis crutches ➢ Industrial safety glasses ➢ Welding glasses ➢ Sports with eyeware	1
	12	Frame availability in Indian market	1
	13	FAQ's by customers and their ideal answers (Trouble Shooting to dispensing)	2
		Total number of Hours	**20**

VISUAL OPTICS II:
INSTRUCTOR INCHARGE: Optometrist (M.Optom/Ph D)

COURSE DESCRIPTION: This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

OBJECTIVES: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

TEXT BOOK/REFERENCE BOOKS:

1. Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann,2007
2. Duke –Elder's practice of Refraction
3. AI Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006
4. George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002
5. Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth – Heinemann, 2002
6. David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth – Heinemann, 2007

7. WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Visual optics -I

COURSE PLAN

	Sl. No	Topics	No. of Hrs
Unit-1	1.	Accommodation & Presbyopia • Far and near point of accommodation • Range and amplitude of accommodation • Mechanism of accommodation • Variation of accommodation with age • Anomalies of accommodation • Presbyopia • Hypermetropia and accommodation	6
Unit-2	2.	Convergence: • Type, Measurement and Anomalies • Relationship between accommodation and convergence-AC/A ratio	3
Unit-3	3.	Objective Refraction (Static & Dynamic) • Streak retinoscopy • Principle, Procedure, Difficulties and interpretation of findings • Transposition and spherical equivalent • Dynamic retinoscopy various methods • Radical retinoscopy and near retinoscopy • Cycloplegic refraction	8
Unit-4	4.	Subjective Refraction: • Principle and fogging • Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and block test),J.C.C • Duochrome test o Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging o Binocular refraction-Various techniques	8
Unit-5	5.	Effective Power &Magnification : • Ocular refraction vs. Spectacle refraction • Spectacle magnification vs. Relative spectacle magnification • Axial vs. Refractive ammetropia, Knapp's law • Ocular accommodation vs. Spectacle accommodation • Retinal image blur-Depth of focus and depth of field	5
		Total number of hours	30

OCULAR DISEASE II :

INSTRUCTOR INCHARGE: Ophthalmologist

CO-INSTRUCTORS: Optometrist (Minimum UG in Optometry)

COURSE DESCRIPTION: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

OBJECTIVES: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on

1. Etiology

2. Epidemiology
3. Symptoms
4. Signs
5. Course sequelae of ocular disease
6. Diagnostic approach, and
7. Management of the ocular diseases.

TEXT BOOK: A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

REFERENCE BOOKS:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease - I

COURSE PLAN

	Sl. No	Topics	No. of Hrs
Unit-1	1.	Retina and Vitreous: • Applied Anatomy • Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) • Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) • Retinal Vasculitis (Eales's) • Retinal Artery Occlusion (Central retinal Artery occlusion) • Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion) • Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations • Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration. • Retinal Detachement: Rhegmatogenous, Tractional, Exudative) • Retinablastoma • Diabetic retinopathy	12
Unit-2	2.	Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury) • Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis) • Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational) • Clinical approach towards ocular injury patients	3

Unit-3	3.	Lens • Applied Anatomy and Physiology • Clinical examination • Classification of cataract • Congenital and Developmental cataract • Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) • Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar. • Management of cataract (Non-surgical and surgical measures; preoperative evaluation, Types of surgeries,) • Complications of cataract surgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microsperophakia.	10
Unit-4	4.	• Clinical Neuro-ophthalmology • Anatomy of visual pathway • Lesions of the visual pathway • Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie's tonic pupil) • Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy • Cortical blindness • Malingering • Nystagmus • Clinical examination	12
Unit-5	5.	• Glaucoma • Applied anatomy and physiology of anterior segment • Clinical Examination • Definitions and classification of glaucoma • Pathogenesis of glaucomatous ocular damage • Congenital glaucoma's • Primary open angle glaucoma • Ocular hypertension • Normal Tension Glaucoma • Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure) • Secondary Glaucoma's • Management : common medications, laser intervention and surgical techniques	8
		Total number of hours	45

PATHOLOGY

INSTRUCTOR INCHARGE: Pathologist with at least Master degree

COURSE DESCRIPTION: This course describes basic aspects of disease processes with reference to specific entities relevant in optometry/ophthalmology.

OBJECTIVES At the end of the course students will acquire knowledge in the following aspects:

1. Inflammation and repair aspects.
2. Pathology of various eye parts and adnexa.

TEXT BOOK K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers,1997

REFERENCE BOOKS:

1. CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
2. S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

PREREQUISITES: Higher Secondary Biology, General and Ocular Anatomy, General and Ocular Physiology

COURSE PLAN (Total: 15 hours)

Unit-1	1. Inflammation and repair 2. Infection in general 3. Specific infections Tuberculosis Leprosy Syphilis Fungal infection Viral chlamydial infection
Unit-2	4. Neoplasia 5. Haematology Anemia Leukemia Bleeding disorders
Unit-3	6. Circulatory disturbances Thrombosis Infarction Embolism
Unit-4	7. Clinical pathology Interpretation of urine report Interpretation of blood smears. 8. Immune system
Unit-5	9. Shock, Anaphylaxis. 10. Allergy

BASIC AND OCULAR PHARMACOLOGY

INSTRUCTOR INCHARGE: Pharmacologist/Optometrist with at least Master degree

COURSE DESCRIPTION: This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

OBJECTIVES: At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and

adverse effects.

TEXT BOOK/REFERENCE BOOKS:

1. K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
2. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
3. T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven,

PREREQUISITES: General Physiology & Biochemistry

COURSE PLAN

	Sl. No	Topics	No. of Hrs
Unit-1	1.	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	**10**
Unit-2	2.	Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti-hypertensive sand drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics,	**10**
Unit-3		General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specificchemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	
Unit-4	3.	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	**10**
Unit-5	4.	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions dfhe eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,Antioxidants	**15**
		Total number of hours	**45**

MEDICAL PSYCHOLOGY

INSTRUCTOR INCHARGE: Clinical Psychologist (Post Graduate/M.Phil/ PhD)

COURSE DESCRIPTION: This course covers various aspects of medical psychology essential for the optometrist.

OBJECTIVES: At the end of the course, the student would have gathered knowledge various aspects of medical psychology essential for him to apply in the clinical scenario during his clinical postings.

TEXT BOOK: Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013

REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: Basic clinical knowledge.

COURSE PLAN Total : 15 hours

Unit-1	1. Introduction to Psychology 2. Intelligence Learning, Memory, Personality, Motiviation
Unit-2	3. Body Integrity – one's body image 4. The patient in his Milen
Unit-3	5. The self-concept of the therapist, Therapist-patient relationship – some guidelines 6. Illness, its impact on the patient
Unit-4	7. Maladies of the age and their impact on the patient's own and others concept of his body image 8. Adapting changes in Vision
Unit-5	9. Why Medical Psychology demands commitment?

INTRODUCTION TO QUALITY AND PATIENT SAFETY

INSTRUCTOR INCHARGE: Qualified personnel to handle the subject, preferably who have experience in handling such scenarios practically or at least experience in teaching.

COURSE DESCRIPTION: This course deals with various aspects of quality and safety issues in health care services.

OBJECTIVES: At the end of the course, students have gained introductory knowledge about quality and patient safety aspects from Indian perspectives.

COURSE PLAN: (Total: 30 hours)

Unit-1	1. Quality assurance and management
Unit-2	2. Basics of emergency care and life support skills
Unit-3	3. Biomedical waste management and environment safety
Unit-4	4. Infection and prevention control 5. Antibiotic resistance
Unit-5	6. Disaster preparedness and management

CLINICAL OPTOMETRY III (STUDENTSHIP) Total Hours: 45 hours

Students will improve their skills in clinical procedures, and then progressive interactions with patients and professional personal are monitored as students practice optometry in supervised setting. Additional area includes problem solving and complications of various managements will be inculcated. Students should have exposure to eye bank facilities and must be made aware of eye donation, collection of eyes, preservation, pre and post-operative instructions and latest techniques for preservation of donor cornea. The students will get clinical training on the practical aspects of the following courses namely optometric optic –II & dispensing optics, visual optics – II and ocular disease -II.

Fifth Semester

CONTACT LENSES I

INSTRUCTOR INCHARGE: B.Optom or optometrists with PG or Ph.D.

COURSE DESCRIPTION: The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

COURSE OBJECTIVES: Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting

5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

TEXT BOOKS:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
4. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
5. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

PREREQUISITES: Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments

COURSE PLAN (Total: 30 hours)

Unit-1	1. Introduction to Contact lenses Definition Classification / Types 2. History of Contact Lenses 3. Optics of Contact Lenses Magnification & Visual field Accommodation & Convergence Back & Front Vertex Power / Vertex distance calculation 4. Review of Anatomy & Physiology of Tear film Cornea Lids & Conjunctiva
Unit-2	5 Introduction to CL materials Monomers, Polymers 6. Properties of CL materials Physiological (Dk, Ionicity, Water content) Physical (Elasticity, Tensile strength, Rigidity) Optical (Transmission, Refractive index) 7 Indications and contraindications 8 Parameters / Designs of Contact Lenses & Terminology 9 RGP Contact Lens materials
Unit-3	10. Manufacturing Rigid and Soft Contact Lenses – various methods 11. Pre-Fitting examination – steps, significance, recording of results 12. Correction of Astigmatism with RGP lens 13. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses 14. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses 15. Calculation and finalising Contact lens parameters

Unit-4	16. Ordering Rigid Contact Lenses – writing a prescription to the Laboratory 17. Checking and verifying Contact lenses from Laboratory 18. Modifications possible with Rigid lenses 19. Common Handling Instructions Insertion & Removal Techniques Do's and Dont's
Unit-5	20. Care and Maintenance of Rigid lenses • Cleaning agents & Importance • Rinsing agents & Importance • Disinfecting agents & importance • Lubricating & Enzymatic cleaners 21. Follow up visit examination 22. Complications of RGP lenses

PRACTICAL (Total: 30 hours)

1. Measurement of Ocular dimensions
2. Pupillary diameter and lid characteristics
3. Blink rate and TBUT
4. Schrimers test, Slit lamp examination of tear layer
5. Keratometry
6. Placido's disc
7. Soft Contact Lens fitting – Aspherical
8. Soft Contact Lens fitting – Lathecut lenses
9. Soft Contact Lens over refraction
10. Lens insertion and removal
11. Lens handling and cleaning
12. Examination of old soft Lens
13. RGP Lens fitting
14. RGP Lens Fit Assessment and fluorescein pattern
15. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
16. RGP over refraction and Lens flexure
17. Examination of old RGP Lens
18. RGP Lens parameters
19. Slit lamp examination of Contact Lens wearers

LOW VISION CARE

INSTRUCTOR INCHARGE: Optometrist with Low vision clinical experience having M Optom/PhD

COURSE DESCRIPTION: This course deal with the definition of low vision, epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

COURSE OBJECTIVES: At the end of the course, the student will be knowledgeable in the following:

1. Definition and epidemiology of Low Vision
2. Clinical examination of Low vision subjects
3. Optical, Non-Optical, Electronic, and Assistive devices.
4. Training for Low Vision subjects with Low vision devices
5. Referrals and follow-up

paediatric population. Also it will inculcate the skill of transferring / communicating the medical information to the attendant / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

COURSE OBJECTIVES: At the end of the course the student is expected to:

1. Have a knowledge of the principal theories of childhood development, and visual development
2. Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
4. Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
5. Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
6. Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care

TEXT BOOKS:

1. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
2. Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

REFERENCE BOOKS:

1. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
2. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
3. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN (Total: 25 hours)

Unit-3	1. The Development of Eye and Vision
	2. History taking Paediatric subjects
	3. Assessment of visual acuity
	4. Normal appearance, pathology and structural anomalies of
	Orbit, Eye lids, Lacrimal system,
	Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
	Lens, vitreous, Fundus Oculomotor system
Unit-4	5. Refractive Examination
	6. Determining binocular status
	7. Determining sensory motor adaptability
	8. Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia,Astigmatism, Anisometropia, Amblyopia
	9. Remedial and Compensatory treatment of Strabismus and Nystagmus

Unit-5	10. Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma,Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics 11. Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism 12. Spectacle dispensing for children 13. Paediatric contact lenses 14. Low vision assessment in children

15.

BINOCULAR VISION I

INSTRUCTOR INCHARGE: Optometrists with B. Optom and experience in Binocular vision course teaching. Or M. Optom or specialised fellowship in Binocular vision optometry.

COURSE DESCRIPTION: This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with basis of normal binocular vision and space perception, Gross anatomy and physiology of extraocular muscles, various binocular vision anomalies, its diagnostic approaches and management.

COURSE OBJECTIVES: On successful completion of this module, a student will be expected to be able to:-

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

TEXT BOOKS:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. Gunter K. V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

PREREQUISITES: Ocular anatomy, Physiology

COURSE PLAN (Total: 30 hours)

Unit-1	1. Binocular Vision and Space perception. Relative subjective visual direction. Retino motor value Grades of BSV SMP and Cyclopean Eye Correspondence, Fusion, Diplopia, Retinal rivalry Horopter Physiological Diplopia and Suppression Stereopsis, Panum's area, BSV. Stereopsis and monocular clues - significance. Egocentric location, clinical applications. Theories of Binocular vision. 2. Anatomy of Extra Ocular Muscles. Rectii and Obliques, LPS. Innervation & Blood Supply.
Unit-2	3. Physiology of Ocular movements. Center of rotation, Axes of Fick. Action of individual muscle. 4. Laws of ocular motility Donder's and Listing's law Sherrington's law Hering's law
Unit-3	5. Uniocular& Binocular movements - fixation, saccadic & pursuits. Version &Vergence. Fixation & field of fixation 6. Near Vision Complex Accommodation Definition and mechanism (process). Methods of measurement. Stimulus and innervation. Types of accommodation. Anomalies of accommodation – aetiology and management.
Unit-4	7. Convergence Definition and mechanism. Methods of measurement. Types and components of convergence - Tonic, accommodative, fusional, proximal. Anomalies of Convergence – aetiology and management. 8. Sensory adaptations Confusion 9. Suppression Investigations Management Blind spot syndrome

Unit-5	10. Abnormal Retinal Correspondence Investigation and management Blind spot syndrome 11. Eccentric Fixation Investigation and management 12. Amblyopia Classsification Aeitiology Investigation Management

SYSTEMIC DISEASES

INSTRUCTOR INCHARGE: General Medicine professional

COURSE DESCRIPTION: This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

COURSE OBJECTIVES: At the end of the course, students should get acquainted with the following:

1. Common Systemic conditions: Definition, diagnostic approach, complications and management options
2. Ocular findings of the systemic conditions
3. First Aid knowledge

TEXT BOOKS:

1. C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
2. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

COURSE PLAN (Total:45 hours)

Unit-1	1. Hypertension Definition, classification, Epidemiology, clinical examination, complications, andmanagement. Hypertensive retinopathy 2. Diabetes Mellitus Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications Diabetic Retinopathy 3. Thyroid Disease Physiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors Grave's Ophthalmopathy
Unit-2	4. Acquired Heart Disease
	Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
	Ophthalmic considerations
	5. Cancer :
	Incidence
	Etiology
	Therapy
	Ophthalmologic considerations
	6. Connective Tissue Disease
	Rheumatic arthritis
	Systemic lupus erythematosus
	Scleroderma
	Polymyositis and dermatomyositis
	Sjogren syndrome
	Behcet's syndrome
	Eye and connective tissue disease
Unit-3	7. Tuberculosis Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis,complications, treatment tuberculosis and the eye. 8. Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus) Herpes and the eye 9. Hepatitis (Hepatitis A, B, C) 10. Acquired Immunodeficiency Syndrome

Unit-4	11. Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations) 12. Common Tropical Medical Ailments Malaria Typhoid Dengue Filariases Onchocerciasis Cysticercosis Leprosy 13. Nutritional and Metabolic disorders: Obesity Hyperlipidaemias Kwashiorkor Vitamin A Deficiency Vitamin D Deficiency Vitamin E Deficiency Vitamin K Deficiency Vitamin B1,B2, Deficiency Vitamin C Deficiency 14. Myasthenia Gravis
Unit-5	15. First Aid General Medical Emergencies Preoperative precautions in ocular surgeries 16. Psychiatry Basic knowledge of psychiatric condition and Patient Management 17. Genetics Introduction to genetics Organisation of the cell Chromosome structure and cell division Gene structure and basic principles of Genetics. Genetic disorders and their diagnosis. Genes and the eye Genetic counseling and genetic engineering.

RESEARCH METHODOLOGY AND BIOSTATISTICS

INSTRUCTOR INCHARGE: Biostatistician/Epidemiologist or Higher optometry holder with experience in biostatistics and research methodology

COURSE OBJECTIVES: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

TEXT BOOKS:

1. Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
2. Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
3. Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

COURSE PLAN (Total: 30 hours)

Research Methodology

Unit-1	1. Introduction to research methods 2. Identifying research problem 3. Ethical issues in research 4. Research design
Unit-2	5. Types of Data 6. Research tools and Data collection methods 7. Sampling methods 8. Developing a research proposal
Unit-3	**Biostatistics** 9. Basics of Biostatistics Introduction of Biostatistics Measures of Morality Sampling Statistical significance Correlation Sample size determination. Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion. Theoretical distributions. Binomial Normal Sampling –necessity of methods and techniques. Chi. Square test (2 x 2)
Unit-4	10. Hospital Statistics and data (evaluation and representation)
Unit-5	11. Use of computerized software for statistics

CLINICAL OPTOMETRY IV (STUDENTSHIP) Total: 45 hours

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advance procedure in those areas. Students will participate in advance and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be providedin various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry.

Sixth Semester

CONTACT LENSES II

INSTRUCTOR INCHARGE: At least M.Optom optometrists with higher qualification

COURSE DESCRIPTION: The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

COURSE OBJECTIVES: Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

TEXT BOOKS:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
4. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
5. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

PREREQUISITES: Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments

COURSE PLAN: Total : 30 hours

Unit-1	1. SCL Materials & Review of manufacturing techniques 2. Comparison of RGP vs. SCL 3. Pre-fitting considerations for SCL
Unit-2	4. Fitting philosophies for SCL 5. Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum 6. Calculation and finalising SCL parameters Disposable lenses Advantages and availability 7. Soft Toric CL Stabilization techniques Parameter selection Fitting assessment

TEXT BOOKS:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
2. Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.

REFERENCE BOOKS:

1. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
2. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
3. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

COURSE PLAN: (Total: 15 hours)

Unit-1	1. Definitions & classification of Low vision 2. Epidemiology of low vision 3. Model of low vision service
Unit-2	4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psychosocial impact of low vision 5. Types of low vision devices – optical devices, non-optical devices & electronic devices
	6. Optics of low vision devices
Unit-3	7. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision devices, instruction & training 8. Pediatric Low Vision care 9. Low vision devices – dispensing & prescribing aspects
Unit-4	10. Visual rehabilitation, Orientation & counseling 11. Legal aspects of Low vision in India
Unit-5	12. Case Analysis

PRACTICALS (Total: 15 hours)

1. Practical 1: Attending in low vision care clinic and history taking.
2. Practical 2:

   Determining the type of telescope and its magnification (Direct comparison method & calculated method)

   Determining the change in field of view with different magnification and different eyeto lens distances with telescopes and magnifiers.
3. Practical 3:

   Inducing visual impairment and prescribing magnification.

   Determining reading speed with different types of low vision aids with same magnification.

   Determining reading speed with a low vision aid of different magnifications.

GERIATRIC OPTOMETRY & PAEDIATRIC OPTOMETRY

GERIATRIC OPTOMETRY

INSTRUCTOR INCHARGE: B.Optom/ M Optom/ Ph D with adequate experience in handling geriatric patients.

COURSE DESCRIPTION: This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing ,and spectacle dispensing aspects in ageing patients.

COURSE OBJECTIVES: The student on taking this course should

1. Be able to identify, investigate the age related changes in the eyes.
2. Be able to counsel the elderly
3. Be able to dispense spectacles with proper instructions.
4. Adequately gained knowledge on common ocular diseases.

TEXT BOOKS: A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.

REFERENCE BOOKS:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN (Total: 20 hours)

Unit-1	1. Structural , and morphological changes of eye in elderly 2. Physiological changes in eye in the course of aging. 3. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD) 4. Optometric Examination of the Older Adult (with special attention to refractive assessment) 5. Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
Unit-2	6. Contact lenses in elderly 7. Pharmacological and nutritional aspects of aging 8. Low vision causes, management and rehabilitation in geriatrics. 9. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames 10. Caring of elderly people and elder abuse.

PEDIATRIC OPTOMETRY

INSTRUCTOR INCHARGE: B.Optom/ M Optom/ Ph D with adequate experience in handling pediatric patients.

COURSE DESCRIPTION: This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to

Unit-3	8. Common Handling Instructions Insertion & Removal Techniques Do's and Dont's 9. Care and Maintenance of Soft lenses Cleaning agents & Importance Rinsing agents & Importance Disinfecting agents & importance Lubricating & Enzymatic cleaners 10. Follow up visit examination
Unit-4	11.Complications of Soft lenses 12. Therapeutic contact lenses • Indications • Fitting consideration
Unit-5	13. Specialty fitting • Aphakia • Pediatric • Post refractive surgery 14. Management of Presbyopia with Contact lenses

PRACTICAL (Total: 30 hours)

1. Examination of old soft Lens
2. RGP Lens fitting
3. RGP Lens Fit Assessment and fluroscein pattern
4. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
5. RGP over refraction and Lens flexure
6. Examination of old RGP Lens
7. RGP Lens parameters
8. Fitting Cosmetic Contact Lens
9. Slit lamp examination of Contact Lens wearers
10. Fitting Toric Contact Lens
11. Bandage Contact Lens
12. SPM & Pachymetry at SN During Clinics
13. Specialty Contact Lens fitting

BINOCULAR VISION II

INSTRUCTOR INCHARGE: Optometrists with B. Optom and experience in Binocular vision course teaching. Or M. Optom or specialised fellowship in Binocular vision optometry

COURSE DESCRIPTION: This course deals with understanding of strabismus, its classification, necessary orthoptic investigations, diagnosis and non-surgical management. Along with theoretical knowledge it teaches the clinical aspects and application.

COURSE OBJECTIVES: The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

TEXT BOOKS:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular

motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company

4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

PREREQUISITES: Ocular Anatomy, Ocular Physiology, Binocular Vision –I.

COURSE PLAN: (Total: 30 hours)

1. Neuro-muscular anomalies
   Classification and etiological factors
2. History – recording and significance.
3. Convergent strabismus
   Accommodative convergent squint
   Classification
   Investigation and Management
   Non accommodative Convergent squint
   Classification
   Investigation and Management
4. Divergent Strabismus
   Classification
   A& V phenomenon
   Investigation and Management
5. Vertical strabismus
   Classification
   Investigation and Management
6. Paralytic Strabismus
   Acquired and Congenital
   Clinical Characteristics
7. Distinction from comitant and restrictive Squint
8. Investigations
   History and symptoms
   Head Posture
   Diplopia Charting
   Hess chart
   PBCT
   Nine directions
   Binocular field of vision
9. Amblyopia and Treatment of Amblyopia
10. Nystagmus
11. Non-surgical Management of Squint
12. Restrictive Strabismus
    Features
    Musculo-fascical anomalies
    Duane's Retraction syndrome
    Clinical features and management
    Brown's Superior oblique sheath syndrome
    Strabismus fixus
    Congenital muscle fibrosis
13. Surgical management

PRACTICAL (Total: 15 hours): Deals with hand-on session the basic binocular vision evaluation techniques.

PUBLIC HEALTH AND COMMUNITY OPTOMETRY

INSTRUCTOR INCHARGE: Public Health professional or optometrist with public health and community optometry experience

COURSE DESCRIPTION: Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems especially focused on Indian scenario.

COURSE OBJECTIVES: At the end of the course students will be be knowledgeable in the following areas:

1. Community based eye care in India.
2. Prevalence of various eye diseases
3. Developing Information Education Communication materials on eye and vision care for the benefit of the public
4. Organize health education programmes in the community
5. Vision screening for various eye diseases in the community and for different age groups.

TEXT BOOKS:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
2. Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980
3. K Park: Park's Text Book of Preventive and Social Medicine, 19th edition,
4. Banarsidas Bhanot publishers, Jabalpur, 2007

REFERENCE BOOKS: MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

PREREQUISITES: Ocular Disease, Visual optics, Optometric Instruments, Clinical Examination of Visual System

COURSE PLAN (Total: 30 hours)

Unit-1	1. Public Health Optometry: Concepts and implementation, Stages of diseases 2. Dimensions, determinants and indicators of health 3. Levels of disease prevention and levels of health care patterns 4. Epidemiology of blindness – Defining blindness and visual impairment
Unit-2	5. Eye in primary health care 6. Contrasting between Clinical and community health programs 7. Community Eye Care Programs 8. Community based rehabilitation programs 9. Nutritional Blindness with reference to Vitamin A deficiency
Unit-3	10. Vision 2020: The Right to Sight 11. Screening for eye diseases 12. National and International health agencies, NPCB, IAPB 13. Role of an optometrist in Public Health
Unit-4	14. Organization and Management of Eye Care Programs – Service Delivery models 15. Health manpower and planning & Health Economics 16. Evaluation and assessment of health programmes

Unit-5	17. Optometrists role in school eye health programmes 18. Basics of Tele Optometry and its application in Public Health 19. Information, Education and Communication for Eye Care programs

PRACTICE MANAGEMENT

INSTRUCTOR INCHARGE: Management professional with masters' qualification in Management or Optometrist with experience of running private clinical services

COURSE DESCRIPTION: This course deal with all aspects of optometry practice management – business, accounting, taxation, professional values, and quality & safety aspects.

COURSE OBJECTIVES: At the end of the course, student would have gained knowledge on various aspects of private optometric practice from Indian perspective.

TEXT BOOKS: Faculty to recommend
REFERENCE BOOKS: Faculty to recommend
PREREQUISITES: Basic Clinical experience
COURSE PLAN (Total: 15 hours)

1. Business Management:
   Practice establishment and development
   Stock control and costing
   Staffing and staff relations
   Business computerization
2. Accounting Principles
   Sources of finance
   Bookkeeping and cash flow
3. Taxation and taxation planning
4. Professionalism and Values

   Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
   Personal values- ethical or moral values
   Attitude and behaviour- professional behaviour, treating people equally
   Code of conduct , professional accountability and responsibility, misconduct
   Differences between professions and importance of team efforts
   Cultural issues in the healthcare environment

OCCUPATIONAL OPTOMETRY

INSTRUCTOR INCHARGE: Occupational Health professional and /or Optometrist with experience in occupational eye health

COURSE DESCRIPTION: This course deals with general aspects of occupational health, Visual demand in various job, task analysing method ,visual standards for various jobs , occupational hazards and remedial aspects through classroom sessions and field visit to the factories.

COURSE OBJECTIVES: At the end of the course the students will be knowledgeable in the following aspects:

1. In visual requirements of jobs;
2. In effects of physical, chemical and other hazards on eye and vision;
3. To identify occupational causes of visual and eye problems;
4. To be able to prescribe suitable corrective lenses and eye protective wear and
5. To set visual requirements, standards for different jobs.

TEXT BOOKS:

1. PP Santanam, R Krishnakumar, Monica R. Dr. Santanam's text book of Occupational optometry. 1st edition, Published by Elite School of optometry , unit of Medical Research

Foundation, Chennai, India , 2015
2. R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001

REFERENCE BOOKS:

1. G W Good: Occupational Vision Manual available in the following website: www.aoa.org
2. N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
3. J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
4. G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

COURSE PLAN: (Total: 15 hours)

Unit-1	1. Introduction to Occupational health, hygiene and safety, international bodies like ILO,WHO, National bodies etc. Acts and Rules - Factories Act, WCA, ESI Act.
Unit-2	2. Electromagnetic Radiation and its effects on Eye 3. Light – Definitions and units, Sources, advantages and disadvantages, standards 4. Color – Definition, Color theory, Color coding, Color defects, Color Vision tests
Unit-3	5. Occupational occular hazards and preventive/protective methods 6. Task Analysis 7. Industrial Vision Screening – Modified clinical method and Industrial Vision test
Unit-4	8. Vision Standards – Railways, Roadways, Airlines/ Armed forces 9. Visual Display Units 10. Contact lens and work
Unit-5	11. Role of Optometrist in occupational health. 12. Sports vision

OPTOMETRY LAW AND ETHICS

INSTRUCTOR INCHARGE: Legal professional and /or Optometrist withexperience in optometry law and ethics.

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

COURSE PLAN (Total: 15 hours)

Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal - Scope

2. Introduction to Code of conduct
3. Basic principles of medical ethics –Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. Medico legal aspects of medical records –Medico legal case and type- Records anddocument related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure – retention of medical records - other various aspects.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.
12. National Commission for allied & Healthcare Professions (NCAHP) Act 2021.

RESEARCH PROJECT/DISSERTATION Total: 30 hours

Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ ophthalmologist). Student will get the experience of doing a researchin systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection,data analysis, thesis writing and presentation.

Project is spread through sixth to eighth semester.

CLINICAL OPTOMETRY V (STUDENTSHIP) Total: 45hours

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship.

Seventh and Eighth Semester

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 6 hours per day and this may be more depending on the need and the healthcare setting.

During these semesters students also will continue the research work allotted during the sixth semester and submit the final report and make presentation in front of the experts.

Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, Independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, optical showrooms and other relevant locations wherein the learning objective can be achieved. Short period of training to eye care (instruments, optical, contact lens) related manufacturing set-ups, corporates and non-governmental organisations.

Skills based outcomes and monitorable indicators for Optometrist

First year:

1. Role play
2. Clinical Observations
3. Vision Check
4. Basic Lensometry

Second year:

1. History taking
2. CEVS practical
3. Refraction Hands On including optical dispensing

4. Clinical Observations
5. Vision screening camps

Third year:

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations

Internship:

1. Primary Eye Care 25 %
2. Dispensing Optics 25 %
3. Contact Lens 10%
4. Low Vision Devices 10%
5. Orthoptics 10%
6. Diagnostics 10 %
7. Anterior Segment clinic 5%
8. Posterior Segment Clinic 5%

Semester	Procedures	Minimum Number	Comments
I year (2nd Semester) **CLINIC - I**	Role Play (Patient- Optometrist)	3 cases	
	Clinical Observation and Report Writing	6 cases	
	Vision Check (Snellen's Chart) – Distance + Near	12 cases	
	Lensometry (Spherical lenses)		
II year (3rd Semester) **CLINIC -II**	History taking - General - Specific - Conditions	9 cases	Can practice on the following complaints : Blurred Vision, Headache, Pain, redness, Watering, Flashes, Floaters, Blackspots
	Lensometry	100 cases	Simple Sphere, Simple cylinder, Spherocylinder (90, 180, Oblique degrees), Bifocals, PAL
	Vision Check (log MAR) Pinhole acuity	100 cases	Simulation, especially to show and ask the students to interpret the findings.
	Extraocular Motility	10 cases	
	Cover test	10 cases	Video output Simulation of various conditions
	Alternate Cover test	10 cases	Video output Simulation of various conditions
	Hirschberg test	10 cases	Video output Simulation of various conditions
	Modified Krimsky test	3 cases	Video output Simulation of various conditions
	Push up test (Amplitude of Accommodation)	10 cases (1 case in presbyopic age)	
	Push up test (Near point of Convergence)	10 cases	

	Stereopsis test	10 cases	
	Tear Break up time	10 cases	
	Amsler's Grid test	10 cases (simulate)	Simulation of various conditions
	Photostress test	10 cases (Normals)	
	Color vision test	10 cases	
	Schirmer's test	10 cases	
	Confrontation test	10 cases	
	Slit lamp illumination	3 cases	
	Slit lamp examination	10 cases	
	Finger tension	10 cases (Normals)	
	Schiotz Tonometry	10 cases (Normals)	
	Applanation Tonometry	10 cases (Normals)	
	Negative Relative Accommodation	10 cases	
	Positive Relative Accommodation	10 cases	
	von Herick Grading of Anterior chamber depth	10 cases	
	Accommodative facility(± 2.00 D)	10 cases	
	Corneal Sensitivity test	10 cases	
	IPD	10 cases	
	Proptosis evaluation	1 demo	Video demonstration of cases
	Ptosis evaluation	1 demo	Video demonstration of cases
	Pupillary evaluation -Direct -Consensual -RAPD	10 cases	
	HVID	10 cases	
	Maddox rod (Phoria)	10 cases	
	Negative Fusional vergence	10 cases	
	Positive Fusional Vergence	10 cases	
II year (4th semester) **CLINIC-III**	Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy	25 + 25 +25 cases	Model eye for retinoscopy.
	Keratometry	25 cases	
	Subjective Refraction JCC Clock Dial Duochrome Borish Delayed	25 cases	
	Addition calculation	25 cases	Give more simulated problems and discuss on it
III year (5th semester) **CLINIC IV**	Direct ophthalmoscope	10 cases (Normals)	Show slides of various commonly seen retinal conditions
	Visual Field chart interpretation	10 cases – discussion	Both kinetic and Static

Semester	Procedures	Minimum Number	Comments
	B scan Interpretation	10 cases – discussion	
	A scan chart Interpretation	10 cases – discussion	Discussion having different types of wave patterns
	Case Analysis	10 cases	
	+90 D lens	10 cases (Normals)	Slides of various Cup: Disc ratios can be shown
III year (6th semester) **CLINIC V**	Gonioscopy	5 cases (Normals)	Slides of abnormal angles
	Posting in Optometry clinics	5+5+5+5+10 cases	Pediatric/contact lens/Lowvision/ Orthoptics/ GOPD
	Camps	4 camps	School screening, Cataract
	IDO (on each other)	10 cases(Normals)	Slides of abnormal fundus
	Case Analysis -	5+ 5+ 5+ 5 cases	Pathology Binocular Vision Clinical Refraction Dispensing optics
IV year (7th & 8th semester) **CLINICAL INTERNSHIP**	General OPD (History taking –DO)	500 cases	Weekly 1 case report submission
	Contact Lens Clinic	20 cases (5 RGP+ 5 Soft + 5 toric)	Totally 3 different case reports submission at the end of the postings
	Opticals	100 cases	Weekly 1 case report submission
	Low Vision care Clinic	10 cases	Totally 3 different case reports submission at the end of the postings
	Binocular Vision clinic	10 cases	Totally 3 different case reports submission at the end of the postings
	Ophthalmology clinic (Common eye conditions)	50 cases	Totally 3 different case reports submission at the end of the postings
	Camps	10 camps	Camp report submission

Choice of Electives in the programs

- Electives: The choice of electives and option to choose specialties like eye banking , ocular prosthesis , ocular imaging, electrophysiology , vision therapy , refractive surgery etc. will be time to time added as per the changing trends.