BLDE
(DEEMED TO BE UNIVERSITY)

Choice Based Credit System (CBCS)

Curriculum

B.Sc. Programme in Optometry

2020-21

Published by
BLDE
(DEEMED TO BE UNIVERSITY)
Declared as Deemed to be University u/s 3 of UGC Act, 1956

The Constituent College
SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA
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BLDE(DU)/REG/B.Sc.-Bio-Sci/2020-21/ 1876 May 12, 2020

NOTIFICATION

Sub: Curriculum for B.Sc. Programme in Biomedical Sciences with Semester Scheme

Ref: 1. Minutes of the meeting of the 5th Standing Committee Academic Council of the University held on 06- 05-2020.
2. Approval of Board of Management dtd.08-05-2020
3. Approval of Hon'ble Vice-Chancellor vide order no.1834, dtd.09-05-2020

In accordance with the Rule-09 (ii) of the Memorandum of Association (MoA) of the Deemed to be University, the Board of Management (BoM) has approved the Curriculum of **'B.Sc. Programme in Biomedical Sciences'** in 1) Medical Laboratory Technology (MLT), 2) Anaesthesia Technology, 3) Operation Theater Technology, 4) Respiratory Care Technology, 5) Cardiac Care Technology, 6) Perfusion Technology, 7) Emergency Medicine Technology, 8) Optometry, 9) Forensic Science, 10) Clinical Genetics, 11) Audiology & Speech-Language Pathology, following Choice Based Credit System (CBCS) with Semester Scheme.

The Curriculum shall be effective from the Academic Session 2020-21 onwards, in the Constituent College of the University viz. Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura.

REGISTRAR
REGISTRAR
BLDE (Deemed to be University)
Vijayapura-586103. Karnataka

To,
The Dean, Faculty of Allied Health Sciences,
Shri B. M. Patil Medical College,
Hospital and Research Centre,
Vijayapura

Copy to:
- The Secretary, UGC, New Delhi
- The Dean, Faculty of Medicine & Principal
- The Controller of Examinations
- The Dean, Student Affairs
- The Prof. & HoDs of Pre, Para and Clinical Departments
- The Coordinator, IQAC
- PS to the Hon'ble Chancellor
- PS to the Hon'ble Vice-Chancellor

Vision:

- To be a leader in providing quality medical education, healthcare & to become an Institution of eminence involved in multidisciplinary and translational research, the outcome of which can impact the health & the quality of life of people of this region.

Mission:

- To be committed to promoting sustainable development of higher education, including health science education consistent with statutory and regulatory requirements.
- To reflect the needs of changing technology
- Make use of academic autonomy to identify dynamic educational programs
- To adopt the global concepts of education in the health care sector

Programme Outcome:

Upon the completion of the course student will be able to:

- Demonstrate the scientific and statistical principles underlying the practice of optometry.
- Examine, diagnose and advise treatment for various ocular disorders
- Design, manufacture and prescribe diverse optical aids including spectacles, sunglasses, ophthalmic lenses, contact lenses etc.
- Lead actively a team of in various inter-disciplinary and multi-disciplinary health care communities.
- Assist Ophthalmologist or efficiently manage and run any ophthalmic or optical clinic industry & trade.
- Undertake Public Health Optometry projects and vision screening eye camps for educating on ocular hygiene and related nutritional and environmental counseling.
- Recognize epidemiological, environmental and etiological factors that require intervention to prevent visual deterioration or ocular disease.
- Demonstrate knowledge of vision care principles that govern ethical decision making and respect for the dignity of the patient.
- Obtain the pertinent information about a patient using communication, observation and diagnostic testing.
- Use modern techniques and technologies for providing vision care solutions to diverse patient population.
- Recognize the need to engage in lifelong learning through continuing education and research.

Programme Specific Outcome:

The graduates will be knowledgeable in ophthalmic and systemic care to practice as an optometrist.

- The graduates will interpret results of common ophthalmic procedures, develop differential and definitive diagnoses, including the skillful use of vision care instruments and material.
- The graduates will be skillful in techniques and current technologies, skillful in problem solving, and will possess professional, ethical and compassionate behavior and standards.
- The graduates will provide quality eye and vision care through comprehensive and appropriate examination, measurement, assessment, diagnosis, treatment and management of eye and vision conditions.
- The graduates will be cognizant and responsive to the health care needs of the community and possess a commitment to continuously improve knowledge and abilities
- The graduates will work and communicate effectively in an inter-disciplinary environment, either independently or in a team, and demonstrate significant leadership qualities.
- The graduates will possess the initiative and critical acumen required to continuously improve their knowledge through self-study, continuing education programme or higher studies.

SEMESTER -I												
Code No.	**Course Name**	**Credits/ Week**				**Hrs/semester**				**Marks**		
		Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Total Credits (C)**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Total hrs.**	**Internal Assessment**	**Semester Exam**	**Total**
Theory												
BO1.1	Human Anatomy Part I	3	-	-	3	45	-	-	45	20	80	100
BO1.2	Human Physiology Part I	3	-	-	3	45	-	-	45	20	80	100
BO1.3	General Biochemistry Nutrition	3	1	-	4	45	15	-	60	20	80	100
BO1.4	Introduction to National Health care System (Multidisciplinary/interdisciplinary)	3	-	-	3	45	-	-	45	20	80	100
Practical												
BO1.1 P	Human Anatomy Part I	-	-	4	-	-	-	-	60	-	-	-
BO1.2 P	Human Physiology Part I	-	-	4	-	-	-	-	60	-	-	-
BO1.3 P	General Biochemistry	-	-	4	-	-	-	-	60	-	-	-
BO1.5 P	Community Orientation & Clinical Visit (including related practical's to the parent course	-	-	4	-	-	-	-	120	-	-	-
Ability Enhancement Elective Course												
BO1.6	English & Communication skills	3	-	-	3	45	-	-	45	100	-	100
BO1.7	Environmental Sciences											
	Total	16	1	22	17	240	15	330	585	180	320	500

SEMESTER -II												
Code No.	**Course Name**	**Credits/ Week**				**Hrs/semester**				**Marks**		
		Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Total Credits (C)**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Total hrs.**	**Internal Assessment**	**Semester Exam**	**Total**
Theory												
BO 2.1	Human Anatomy Part II	2	-	-	2	30	-	-	30	10	40	50
BO 2.2	Human Physiology Part II	2	-	-	2	30	-	-	30	10	40	50
BO 2.3	General Microbiology	3	-	-	3	45	-	-	45	20	80	100
BO 2.4	Basic Pathology & Haematology	3	1	-	4	45	15	-	60	20	80	100
BO 2.5	Introduction to Quality and Patient safety (Multidisciplinary/Interdisciplinary)	3	-	-	3	45	-	-	45	20	80	100
Practical												
BO 2.1P	Human Anatomy Part II	-	-	4	-	-	-	60	60	-	-	-
BO 2.2P	Human Physiology Part II	-	-	2	-	-	-	30	30	-	-	-
BO 2.3P	General Microbiology	-	-	4	-	-	-	60	60	-	-	-
BO 2.4P	Basic Pathology & Haematology	-	-	4	-	-	-	60	60	-	-	-
BO 2.6P	Community Orientation & Clinical Visit (Including related practical's to the parent course)	-	-	8	-	-	-	120	120	-	-	-
Skill Enhancement Elective Course												
BO 2.7	Medical Bioethics & IPR	3	-	-	-	45	-	-	45	100	-	100
BO 2.8	Human Rights & Professional Values											
		16	1	22	17	240	15	330	585	180	320	500

SEMESTER -III

Code No.	Course Name	Credits/ Week					Hrs/semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BO 3.1	Physical Optics	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 3.2	Geometrical Optics	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 3.3	Visual Optics I/II	4	-	-	-	4	60	-	-	-	60	20	80	100
BO 3.4	Ocular disease I	4	-	-	-	4	60	-	-	-	60	20	80	100
BO 3.5	Clinical Examination and Visual systems	2	-	-	-	2	30	-	-	-	30	20	80	100
Practical														
BO 3.1P	Physical Optics	-	-	4	-	2	-	-	60	-	60	10	40	50
BO 3.2P	Geometrical Optics	-	-	4	-	2	-	-	60	-	60	50	-	50
BO 3.3P	Visual Optics I/II	-	-	4	-	2	-	-	60	-	60	50	-	50
BO 3.5P	Clinical Examination and Visual systems	-	-	4	-	2	-	-	60	-	60	10	40	50
Generic Elective Course														
BO 3.6	Pursuit of Inner Self-Excellence (POIS)	3	-	-	-	3	45	-	-	-	45	100	-	100
BO 3.7	Organisational Behaviour													
Total		19	0	16	0	27	285	0	240	0	525	320	480	800

SEMESTER- IV

Code No.	Course Name	Credits/ Week					Hrs/semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BO 4.1	Optometric Optics I & II	4	-	-	-	4	60	-	-	-	60	20	80	100
BO 4.2	Ocular diseases II & Glaucoma	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 4.3	Dispensing optics	3	0	-	-	3	45	-	-	-	45	20	80	100
BO 4.4	Optometric Instrumentation	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 4.5	Basic & Occular Pharmacology	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 4.6 CP	Directed Clinical Education-I	-	-	-	15	5	-	-	-	225	225	50	-	50
Practical														
BO 4.1P	Optometric Optics I & II	-	-	6	-	3	-	-	90	-	90	10	40	50
BO 4.3P	Dispensing optics	-	-	6	-	3	-	-	90	-	90	10	40	50
BO 4.4P	Optometric Instrumentation	-	-	2	-	-	-	-	90	-	90	-	-	-
Ability Enhancement Elective Course														
BO 4.7	Computer and Applications	3	-	-	-	3	45	-	-	-	45	100	-	100
BO 4.8	Biostatics and Research Methodology													
Total		18	0	14	15	29	270	0	210	225	705	270	480	750

SEMESTER- V

Code No.	Course Name	Credits/ Week					Hrs/semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BO 5.1	Contact Lenses I	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 5.2	Binocular Vision I&II	4	-	-	-	4	60	-	-	-	60	20	80	100
BO 5.3	Low Vision Aids	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 5.4	Systemic Disease	3	-	-	-	3	45	-	-	-	45	20	80	100
BO 5.5 CP	Directed Clinical Education-II	-	-	-	27	9	-	-	-	405	405	50	-	50
Practical														
BO 5.1P	Contact Lenses I	-	-	2	-	1	-	-	30	-	30	10	40	50
BO 5.2P	Binocular Vision I&II	-	-	2	-	1	-	-	30	-	30	10	40	50
Core Elective Course														
BO 5.6	Basic of Clinical Skill Learning	3	-	-	-	3	45	-	-	-	45	100	-	100
BO 5.7	Hospital Operation Management													
Total		15	0	4	27	26	225	0	60	405	690	250	400	650

SEMESTER- VI

Code No.	Course Name	Credits/ Week					Hrs/semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BO 6.1	Contact Lenses II	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 6.2	Sports Vision	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 6.3	Paediatrics and Geriatric Optometry	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 6.4	Occupational Optometry	2	-	-	-	2	30	-	-	-	30	20	80	100
BO 6.5 CP	Directed Clinical Education-II	-	-	-	36	12	-	-	-	540	540	50	-	50
Practical														
BO 6.1P	Contact Lenses II	-	-	2	-	1	-	-	30	-	30	10	40	50
BO 6.3P	Paediatrics and Geriatric Optometry	-	-	2	-	1	-	-	30	-	30	10	40	50
Total		8	0	4	36	22	120	0	60	540	720	150	400	550

INTERNSHIP										
Course Code	Course Name	Credits/Week				Hrs/semester				
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.
BO 7.1	Internship	-	-	-	1440	-	-	-	1440	1440
Total		0	0	0	1440	0	0	0	1440	1440

Rules and Regulations of Curriculum

B.Sc. Optometry

Definitions of Key Words:

1. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year. Choice Based Credit System (CBCS).

2. The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

3. **Course**: Usually referred to, as "papers" is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ outreach activities/ project work/ viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.

4. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.

5. **Credit:** A unit by which the course work is interpreted. It functions the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.

6. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the sum total of the credit points obtained by the student in various courses in all semesters and the sum of the total credits of all courses in all the semesters.

7. **Grade Point:** It is a numerical marking allotted to each letter grade on a 10-point scale.

8. **Letter Grade:** It is an appreciated point of the student's performance in a selected course. Grades are denoted by letters O, A+, A, B, C and RA x. Programme: An educational programme leading to award of a Degree certificate.

9. **Semester Grade Point Average (SGPA):** It is index of performance of all performance of work in a semester. Its total credit points obtained by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

10. **Semester:** Each semester will consist of minimum of 180 working days. The odd semester may be scheduled from June/ July to December and even semester from December/ January to June.

Duration of Study Programme:
The duration of the study for Optometry will be of 3 years + 6 Months of Internship.

Program pattern:
- First Semester: July
- Second Semester: January
- Third Semester: July
- Fourth Semester: January
- Fifth Semester- July
- Sixth Semester-January

Eligibility Criteria:
- He/she has passed the Higher Secondary (10+2) with Science (PCB) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks in Physics, Chemistry, and Biology.
- Minimum percentage of marks: 45% aggregate.

Medium of Instruction:
English shall be the Medium of Instruction for all the Courses of study and for examinations.

CBCS – Definition and benefits: Choice Based Credit System is a flexible system of learning. The distinguishing features of CBCS are the following:

- It permits students to learn at their own pace.
- The electives are selected from a wide range of elective courses offered by the other University Departments.
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary and intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines
- Has an inbuilt evaluation system to assess the analytical and creativity skills of students in addition to the conventional domain knowledge assessment pattern.

Semester System and Choice Based Credit System:

The semester system initiates the teaching-learning process and screws longitudinal and latitudinal mobility of students in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a sun shone‟ type approach in which the students can take choice of courses, learn and adopt an interdisciplinary approach of learning.

Semesters:

An academic year consists of two semesters:

	UG
Odd Semester 1st semester	July – December
Odd Semester 3rd, 5thsemesters	June – October/ November
Even Semester 2nd, 4th, 6thsemesters	December –April

Credits:

Credit defines the coefficient of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/ tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20 week schedule:

a. ***1 credit*** **=** 1 hour of lecture per week
b. ***3 credits*** = 3 hours of instruction per week
- ✓ Credits will be assigned on the basis of the lectures (L) / tutorials (T) / Clinical Training (CR) / laboratory work (P) / Research Project (RP) and other forms of learning in a 15- 20 week schedule L - One credit for one hour lecture per week

c. **P/T -** One credit for every two hours of laboratory or practical
d. **CR -** One credit for every three hours of Clinical training/Clinical rotation/posting
e. **RP** - One credit for every two hours of Research Project per week – Max Credit 20-25

	Lecture - L	**Tutorial - T**	**Practical - P**	**Clinical Training/ Rotation– CT/CR**	**Research Project– RP***
1 Credit	1 Hour	2 Hours	2 Hours	3 Hours	2 Hours
RP*	Maximum Credit 20 – 25 / Semester				

Types of Courses: Courses in a programme may be of three kinds:

- **Core Course**
- **Elective Course**
- **Ability Enhancement Compulsory Courses**

Core Course: A course, which should compulsorily be studied by a candidate as a basic requirement is termed as a Core course. There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a basic requirement to complete programme of respective study.

Elective Course: A course which can be chosen from a very specific or advanced the Course of study or which provides an extended scope or which enables an exposure to some other domain or expertise the candidates ability is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses offered by the main Course of study are referred to as Discipline Specific Elective. The University / Institute may also offer discipline related Elective courses of interdisciplinary nature. An elective may be "Discipline Specific Electives (DSE)" gazing on those courses which add intellectual efficiency to the students.

Dissertation / Project: An Elective/Core course designed to acquire special / advanced knowledge, such as supplement study / support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher / faculty member is called dissertation / project.

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/Course, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline / Course may be treated as an elective by other discipline / Course and vice versa and such electives may also be referred to as Generic Elective.

Ability Enhancement Compulsory Courses: The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC).

"AECC" courses are the courses based upon the content that leads to Knowledge enhancement (i) Environmental Science and (ii) English/MIL Communication. These are mandatory for all disciplines.

Assigning Credit Hours per Course: While there is flexibility for the departments in allocation of credits to various courses offered, the general formula would be:

- All core course should be restricted to a maximum of 4 credits.
- All electives should be restricted to a maximum of 3 credits.
- All ability enhancement course should be restricted to a maximum of 2 credits.
- Projects should be restricted to a maximum of 20-25 credits.

Rules and Regulation for Examination of Optometry Program under CBCS Pattern

1. **Title of the Programme offered**: **BSc in Optometry**

2. **Duration of the Programme:** Three years + 6 Months of Internship.

3. **Medium of instruction:** The medium of instruction and examination shall be in English

4. **Letter Grades and Grade Points:**

Adopted the UGC recommended system of awarding grades and CGPA under Choice Based Credit Semester System.

4.1 Would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

4.2 The UGC recommended 10-point grading system with the following letter grades will be followed:

Table 1: Grades and Grade Points:

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B (Good)	7
C (Above Average)	6
F (Fail)/ RA (Reappear)	0
Ab (Absent)	0
Not Completed (NC)	0
RC (<50% in attendance or in Internal Assessment)	

4.3 A student obtaining Grade F/RA will be considered failed and will require reappearing in the examination.

4.4 Candidates with NC grading are those detained in a course (s); while RC indicate student not fulfilling the minimum criteria for academic progress or less than 50% attendance or less than 50% in internal assessments (IA). Registrations of such students for the respective courses shall be treated as cancelled. If the course is a core course, the candidate has to re-register and repeat the course when it is offered next time.

5. CBCS Grading System - Marks Equivalence Table

5.1 Table 2: Grades and Grade Points

Letter Grade	Grade Point	% of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60 -69
B (Good)	7	55 -59
C (Above Average) – **Passing criteria for Optometry**	6	50- 54
F (Fail))/ RA (Reappear)	0	Less than 50
Ab (Absent)	0	-
NC- not completed	0	-
RC- Repeat the Course	0	0

5.2 Table 3: Cumulative Grades and Grade Points

Letter Grade	Grade Point	CGPA
O (Outstanding)	10	9.01 - 10.00
A+ (Excellent)	9	8.01 – 9.00
A (Very Good)	8	7.01 – 8.00
B (Good)	7	6.00 - 7.00
C (Above Average)	6	5.01 - 6.00

6. Assessment of a Course: Evaluation for a course shall be done on a continuous basis. Uniform procedure will be adopted under the CBCS to conduct internal assessments (IA), followed by one end-semester university examination (ES) for each course.

6.1 For all category of courses offered (Theory, Practical, Discipline Specific Elective [DE] ; Generic Elective [GE] and Ability Enhancement Courses [AE]; Skills Enhancement Courses [SE] Theory or P (Practical) & RP(Research Project), assessment will comprise of Internal Assessment (IA) in the form of continuous comprehensive evaluation and mid-semester exam, end–semester (ES) examination or college exam as applicable.

6.2 Courses in programs wherein Theory and Practical/Clinical are assessed jointly. The minimum passing head has to be 50% Grade each for theory and practical's separately. RA grade in any one of the components will amount to reappearing in both components. i.e. theory and practical.

6.3 Evaluation for a course with clinical rotation or clinical training or internship will be done on a continuous basis.

7. Eligibility to appear for the end-semester examinations for a course includes:

7.1 Candidates having ≥ 75% attendance and obtaining the minimum 40% in internal assessment in each course to qualify for appearing in the end-semester university examinations.

7.2 The students desirous of appearing for university examination shall submit the application form duly filled along with the prescribed examination fee.

7.3 Incomplete application forms or application forms submitted without prescribed fee or application form submitted after due date will be rejected and student shall not be allowed to appear for examination.

8. Passing Heads

8.1 Courses where theory and practical are involved, the minimum passing head shall be 50% in total including the internal assessment.

8.2 Elective Courses – the minimum prescribed marks for a pass in elective Course should be 50%. The marks obtained in elective Courses should be communicated to the university before the commencement of the university examination.

9 Detention: A student not meeting any of the above criteria maybe detained (NC) in that particular course for the semester. In the subsequent semester, such a candidate requires improvement in all, including attendance and/or IA minimum to beco me eligible for the next end-semester examination.

10 The maximum duration for completing the program will be 6 years (minimum duration of program x 2) i.e. (3x2) = 6 years, failing which his/her registration will be cancelled. Full fees of entire program of 3 years may be liable to be paid by the students.

11 Carry over benefit:

11.1 A student will be allowed to keep term for Semester II irrespective of number of heads of failure in Semester I.

11.2 A student will be allowed to keep term for Semester III if she/he passes each Semester I and II OR fails in not more than 2 courses each in semester I and II.

11.3 Student will be allowed to keep term for Semester IV irrespective of number of heads of failure in Semester III. However, student must mandatorily have passed each course of Semester I and II in order to appear for Semester IV exam.

11.4 Student will be allowed to keep term for Semester V, if she/he passes Semester I,II, III and IV OR has passed in all courses of Semester I and II and fails in not more than two courses each of Semester III and IV.

11.5 Student will be allowed to keep term for Semester VI, irrespective of number of heads of failure in Semester V. However, student must mandatorily have passed each course of Semester I, II, III and IV in order to appear for Semester VI exam.

12 Grace Marks for UG Courses:

12.1 A student shall be eligible for grace marks, provided he/she appeared in all the papers prescribed for the examination.

12.2 Maximum up to 5 grace marks may be allowed for passing, spread over between Courses.

12.3 No grace marks will be awarded in internal evaluation.

13 University End-Semester Examinations

13.1 There will be one final university examination at the end of every semester.

13.2 A student must have minimum 75% attendance (Irrespective of the type of absence) in theory and practical in each Course to be eligible for appearing the Universit y examination.

13.3 The Principal / Director shall send to the university a certificate of completion of required attendance and other requirements of the applicant as prescribed by the university, two weeks before the date of commencement of the written examination.

13.4 A student shall be eligible to sit for the examination only, if she / he secure a minimum of 40% in internal assessment (individually in theory and practical as applicable). Internal examinations will be conducted at college/ department level.

13.5 Notwithstanding any circumstances, a deficiency of attendance at lectures or practical maximum to the extent of 10% - may be condoned by the Principal / Director.

13.6 If a student fails either in theory or in practical, he/ she have to re-appear for both.

13.7There shall be no provision of re-evaluation of answer sheets. Student may apply to the university following due procedure for recounting of theory marks in the presence of the Course experts.

13.8 Internal assessment shall be submitted by the Head of the Department to the University through Dean at least two weeks before commencement of University theory examination.

14. Supplementary examination: The supplementary examination will be held in the next semester. Eligibility to appear for supplementary examination will be as per rule number 11.1-11.5.

15. Re-Verification

There shall be provision of re-totaling of the answer sheets; candidate shall be permitted to apply for recounting/re-totaling of theory papers within 8 days from the date of declaration of results.

16. Scheme of University Exam Theory UG Program: General structure / patterns for setting up question papers for Theory / Practical courses, for UG program are given in the following tables. Changes may be incorporated as per requirements of specific courses.

Guidelines to Prepare Internship Research Proposal & Project

1. **Selection of Research Problem:**
   Select your interest area of research, based on felt need, issues, social concern.
   a. State the problem in brief, concise, clear.
   b. State the purpose of selected study & topic.
   c. State the objectives of proposal/project.
   d. Prepare conceptual framework based on operational definition.
   e. Write scope of research proposal/project.

2. **Organizing Review of Literature**
   a. Study related and relevant literature which helps to decide conceptual framework and research design to be selected for the study
   b. Add specific books, bulletins, periodicals, reports, published dissertations, encyclopaedia and text books
   c. Organize literature as per operational definition
   d. Prepare summary table for review of literature

3. **Research Methodology: To determine logical structure & methodology for research project.**
   a. Decide and state approach of study i.e. experimental or non-experimental
   b. Define/find out variables to observe effects on decided items & procedure
   c. Prepare simple tool or questionnaire or observational checklist to collect data.
   d. Determined sample and sampling method
   e. Mode of selection ii) Criteria iii) Size of sample iv) Plan when, where and how data will be collected.
   f. Test validity of constructed tool
   g. Check reliability by implementing tool before pilot study(10% of sample size)
   h. Conduct pilot study by using constructed tool for 10% selected sample size

4. **Data collection: To implement prepared tool**
   a. Decide location
   b. Time
   c. Write additional information in separate exercise book to support inferences and interpretation

5. **Data analysis and processing presentation**
   a. Use appropriate method of statistical analysis i.e. frequency and percentage
   b. Use clear frequency tables, appropriate tables, graphs and figures.
   c. Interpretation of data: d.
      In relation to objectives
   e. Hypothesis
   f. Variable of study or project
   g. writing concise report

6. Writing Research Report

a. **Aims**:

i. To organize materials to write project report

ii. To make comprehensive full factual information iii.

To make appropriate language and style of writing

iv. To make authoritative documentation by checking footnotes, references & bibliography

v. To use computers & appropriate software

b. Points to remember

i. Develop thinking to write research report

ii. Divide narration of nursing research report

iii. Use present tense and active voice

iv. Minimize use of technical language

v. Use simple, straightforward, clear & concise language

vi. Use visual aids in form of table, graphs & figures

vii. Treat data confidentially

viii. Review & rewrite if necessary

Evaluation Criteria for Project Report

Sr. No	Criteria	Rating					Remark
		1	2	3	4	5	
I	**Statement of the problem**						
	1. Significance of the problem selected						
	2. Framing of title and objectives						
II	**Literature Review**						
	1. Inclusion of related studies on the topic and its relevance						
	2. Operational definition						
III	**Research Design**						
	1. Use of appropriate research design						
	2. Usefulness of the research design to draw the inferences among study variables/ conclusion						
IV	**Sampling Design**						
	1. Identification & description of the target population						
	2. Specification of the inclusion & exclusion criteria						
	3. Adequate sample size, justifying the study design to draw conclusions						
V	**Data Collection Procedure**						

	1. Preparation of appropriate tool						
	2. Pilot study including validity & reliability of tool						
	3. Use of appropriate procedure/ method for data collection						
VI	**Analysis of Data & Interpretation**						
	1. Clear & logical organization of the finding						
	2. Clear presentation of tables(title, table & column heading)						
	3. Selection of appropriate statistical tests						
VII	**Ethical Aspects**						
	1. Use of appropriate consent process						
	2. Use of appropriate steps to maintain ethical aspects & principles						
VIII	**Interpretation of the finding**						
	& appropriate discussion of the results						
IX	**Conclusion**						
	Summary & recommendations						
X	**Presentation/ Report Writing**						
	Organization of the project work including language & style of presentation						

Signature of the Evaluator

18. Eligibility for award of degree

18.1 A candidate shall have passed in all the Courses of all semester's I-VI, completed internship and submitted research project report to be eligible for award of Optometry degree.

The performance of a candidate in a course will be indicated as a letter grade, whereas grade point will indicate the position of the candidate in that batch of candidates. A student is considered to have completed a course successfully and earned the prescribed credits if he/she secures a letter grade other than F/RA. A letter grade RA in any course implies he/she has to Re-appear for the examination to complete the course.

18.2 The RA grade once awarded in the grade card of the student is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the subsequent semester in which the candidate has appeared for clearance in supplementary exams

18.3 If a student secures RA grade in the Project Work/Dissertation, he/she shall improve it and resubmit it, if it involves only rewriting / incorporating the revisions suggested by the evaluators. If the assessment indicates lack of student performance or data collection then the student maybe permitted to re-register by paying the prescribed re-registration fee and complete the same in the subsequent semesters.

A candidate shall be declared to have passed the examination if he/she obtains the following minimum qualifying grade / marks:-

(a) For Core courses CT (Core Theory), CL (Core Lab), DE (Discipline centric Electives), clinical rotation and internship student shall obtain Grade B (50 % of marks) in the University End Semester Examination (ES) and in aggregate in each course which includes both Internal Assessment and End Semester Examination.

(b) For Generic Electives (GE), Ability Enhancement (AE) and Skill Enhancement (SE) courses student shall obtain Grade D (40 % of marks) in the College Examination.

19. Guidelines for Clinical Internship or Research internship:

19.1 Internship may be commenced only on completion of all course work. The internship may be observed only at the clinical postings and areas of extension activities of Department of Physiotherapy, BLDEDU. No external postings will be considered during internship. Students are expected to act in a responsible and professional manner at all times during their postings.

19.2 Eligibility for appearing for Internship: On completion of all course work, a candidate is permitted by the Director/Principal to join internship during the beginning of the semester i.e., Odd/ Even.

19.3 Responsibilities during internship: During the internship period candidates should show at least 90% attendance. They must engage in practice/ skill based learning of professional conduct. Their learning outcomes must be maintained and presented in the form of logbooks/ case studies/ research project report. The appropriate formats for the postings/ clinical rotations/ research assignments will be are prescribed as required.

19.4 Evaluation of internees and award of credits: All internees will be assessed based on their satisfactory attendance, performance in the postings/ research labs and the presentation of the logbook. The credits and hours of internship will be as defined in the Optometry program

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone & earned by a student, i.e.,

$$SGPA\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone & earned by a student over all the semesters of a programme, i.e.

$$CGPA = \sum(Ci \times Si) / \sum Ci$$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA

Course	**Credit**	**Grade Letter**	**Grade Point**	**Credit Point (Credit x Grade)**
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139
Illustration for SGPA Thus, SGPA = 139/20 = 6.95				

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 20 SGPA : 6.9	Credit : 22 SGPA : 6.8	Credit : 25 SGPA : 6.6	Credit : 26 SGPA : 6.0
Semester 5	**Semester 6**		
Credit : 26 SGPA : 6.3	Credit : 25 SGPA : 8.0		
Illustration for CGPA			

Thus,

$$CGPA = \frac{20 \times 6.9 + 22 \times 6.8 + 25 \times 6.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144} = 6.75/B+$$

ii. Transcript: Based on the above recommendations on Letter grades, grade points and SGPA and CGPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters may be issued.

Course Registration

17.1. After admission to a Program, a student identity number is generated .This PRN number may be used in the process of registration for a course.

17.2 The registration process is a registration for the courses in a semester. The registration card is generated after a student completes the choice of electives. Every student shall register for the stipulated number of Courses/Credits semester wise even if electives are not prescribed in their regulations for the said semester. Every student must register for Elective/Ability Enhancement Courses semester-wise for the courses he/she intends to undergo in that semester within two weeks of commencement of the semester.

The list of students registered for each elective will be communicated to the HoDs/ Course Chairpersons. Students will be requested to authenticate the chosen electives by appending their signature in acceptance with approval by the HoDs/ Course Chairpersons. A soft copy of the registered students will be submitted to the elective course offering departments for their official use.

Re - Entry after Break of Study:

The University regulations for readmission are applicable for a candidate seeking re-entry to a program.

a) Students admitted the program and absenting for more than 3 months must seek readmission into the appropriate semester as per university norms.
b) The student shall follow the syllabus in vogue (currently approved / is being followed) for the program.
c) All re-admissions of students are Course to the approval of the Vice-Chancellor.

Ranking

The first two ranks of the programme will be decided on the basis of grades of CGPA in the courses (core and DE courses only). In case of a tie, marks % [of core and DE courses only] will be taken into account.

Classification of Successful Candidates

Overall Performance in a Program and Ranking of a candidate is in accordance with the University regulations.

Consolidated Grade Card – Optometry Program			
Letter Grade	% Marks Range	Grade point	CGPA RANGE
O	80 & Above	10	9.01 – 10
A+	75-80	9	8.01 - 9.00
A	60-74	8	7.01 - 8.00
B+	55-59	7	6.01- 7.00
B	50-54	6	5.01- 6.00
F/RA (Reappear)	Less than 50	0	4.51 – 5.00
Ab (Absent)		0	
Not Completed (NC)		0	
Repeat the course (RC = <50% in attendance or Internal Assessment)		0	

A successful candidate will be:

i. Who secures not less than O grade with a CGPA of 9.01 – 10.00 shall be declared to have secured 'OUTSTANDING' provided he/she passes the whole examination in the FIRST ATTEMPT;

ii. Who secures not less than A+ grade with a CGPA of 8.01 – 9.00 shall be declared to have secured 'EXCELLENT' provided he/she passes the whole examination in the FIRST ATTEMPT;

iii. Who secures not less than A grade with a CGPA of 7.01 –8.00 and completes the course within the stipulated course period shall be declared to have passed the examinations with 'Very Good'

iv. All other candidates (with grade B and above) shall be declared to have passed the examinations.

SEMESTER-I

BO1.1 Human Anatomy- Part I

Teaching Objective	• To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system
Learning Outcomes	• Comprehend the normal disposition, interrelationships, gross, functional and applied anatomy of various structures in the human body. • Demonstrate and understand the basic anatomy of Respiratory and Circulatory system • Demonstrate and understand the basic anatomy of Digestive and Excretory system

Sr. No.	Topics	No. of Hrs.
1	**Introduction to Anatomy , Terminology, Cell and Cell division, Tissues of body, Skin**	5
2	**Skeletal System** - Classification of bones, Parts of developing long bone and its blood supply, JointsI- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I, Axial skeleton-II	8
3	**Muscular System** - Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back , Muscles of abdomen	7
4	**Joints** – Shoulder, Hip , Knee , Movements and muscle groups producing movements at other joints	4
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	6
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastenum , Blood vessels of Thorax	5
7	**Digestive System** - GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	7
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	3
Total		**45 hrs**

BO1.1 P - Human Anatomy Part I- (Demonstration)

Sr.No.	Topics	No of Hrs
1	**Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**	60
2	**Skeletal System** - Classification of bones, Parts of developing long bone and its blood supply, JointsI- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I , Axial skeleton-II	
3	**Muscular System** - Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back , Muscles of abdomen	
4	**Joints** – Shoulder, Hip ,Knee , Movements and muscle groups producing , movements at other joints	
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastenum , Blood vessels of Thorax	
7	**Digestive System** - GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	
Total		**60 hrs**

Text Books :

1. Manipal Manual of Anatomy for Allied Health Sciences courses:Madhyastha S.
2. G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology
3. B.D. Chaurasia: Handbook of General Anatomy

Reference books:

1. B.D. Chaurasia :
   Volume I-Upper limb & Thorax,
   Volume II- Lower limb, Abdomen & Pelvis
   Volume III- Head, Neck, Face
   Volume IV- Brain-Neuroanatomy
2. Vishram Singh :
   Textbook of Anatomy Upper limb & Thorax
   Textbook of Anatomy Abdomen & Lower limb
   Textbook of Head neck and Brain
3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
4. T.S. Ranganathan : Text book of Human Anatomy
5. Inderbirsingh, G P Pal : Human Embryology
6. Textbook of Histology, A practical guide:- J.P Gunasegaran

BO1.2 Human Physiology Part I

Teaching objective	• To teach basic physiological concepts related to General physiology, Haematology, Nerve-Muscle physiology, Cardiovascular ,Digestive & Respiratory physiology
Learning outcomes	To understand the basic physiological concepts of General physiology To understand the basic physiological concepts of Hematology To understand the basic physiological concepts of Nerve - Muscle physiology To understand the basic physiological concepts of Respiratory physiology To understand the basic physiological concepts of Cardiovascular physiology

Sr.No.	Topics	No. of Hrs.
1	**General Physiology**- Introduction to physiology, Homeostasis, Transport Across cell membrane	3
2	**Blood - Composition, properties and functions of Blood,** Haemopoesis , Haemogram (RBC, WBC, Platelet count, Hb Concentrations), Blood Groups - ABO and RH grouping, Coagulations & Anticoagulants, Anaemias: Causes, effects & treatment, Body Fluid: Compartments, Composition, Immunity – Lymphoid tissue	10
3	**Cardio vascular system -** Introduction, general organization, functions & importance of CVS , Structure of heart, properties of cardiac muscle, Junctional tissues of heart & their functions, Origin & spread of Cardiac Impulse, cardiac pacemaker, Cardiac cycle & E C G, Heart Rate & its regulation, Cardiac output, Blood Pressure definition & normal values, Physiological needs & variation, regulation of BP	10
4	**Digestive system -** General Introduction, organization, innervations & blood supply of Digestive system, Composition and functions of all Digestive juices, Movements of Digestive System (Intestine), Digestion & Absorption of Carbohydrate, Proteins & Fats	6
5	**Respiratory System -**Physiologic anatomy, functions of respiratory system, non respiratory functions of lung, Mechanism of respiration, Lung Volumes & capacities, Transport of Respiratory GasesO_2, Transport of Respiratory Gases CO_2, Regulation of Respiration.	10
6	**Muscle nerve physiology -** Structure of neuron & types, Structure of skeletal Muscle, sarcomere, Neuromuscular junction& Transmission. Excitation & contraction coupling (Mechanism of muscle contraction)	6
Total		**45 hrs**

BO1.2 P - Human Physiology Part I (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Study of Microscope and its use, Collection of Blood and study of Haemocytometer	60
2	Haemoglobinometry	
3	White Blood Cell count	
4	Red Blood Cell count	
5	Determination of Blood Groups	
6	Leishman's staining and Differential WBC Count	
7	Determination of Bleeding Time, Determination of Clotting Time	
8	Pulse & Blood Pressure Recording, Auscultation for Heart Sounds	
9	Artificial Respiration –Demonstration, Spirometry-Demonstration	
Total		**60 hrs**

Textbooks

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books

1. Textbook of Medical Physiology, Guyton , 2nd South AsiaEdition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
3. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

1.3 General Biochemistry & Nutrition

Teaching Objective	At the end of the course, the student demonstrates his knowledge and understanding on: • Structure, function and interrelationship of biomolecules and consequences of deviation from normal. • Integration of the various aspects of metabolism, and their regulatory pathways. • Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data. • to diagnose various nutritional deficiencies • Identify condition and plan for diet • Provide health education base on the client deficiencies
Learning Outcomes	• Define "biochemistry." • Identify the five classes of polymeric biomolecules and their monomeric building blocks. • Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action. • Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP. • Describe how fats and amino acids are metabolized, and explain how they can be used for fuel. • Describe the structure of DNA, and explain how it carries genetic information in its base sequence. • Describe DNA replication. • Describe RNA and protein synthesis. • Explain how protein synthesis can be controlled at the level of transcription and translation. • Summarize what is currently known about the biochemical basis of cancer.

Sr. No.	Topics	No. of Hrs.
1	Introduction and scope of biochemistry	1
2	**Chemistry of carbohydrates, proteins, lipids and nucleic acid–** **Chemistry of Carbohydrates**: Definition, Functions, Properties, Outline of classification with eg.(Definition of Monosaccharides, Disaccharides, Polysaccharides and their examples). **Chemistry of Proteins:**Amino acids (total number of amino acids, essential and non essential amino acids) .Definition, Classification of Proteins Structural orgnisation of protein, Denaturation of Proteins. **Chemistry of Lipids:** Definition, functions, Classification (Simple Lipids, Compound Lipids, Derived Lipids.) Essential Fatty Acids. **Chemistry of Nucleic acid**:Nucleosides and Nucleotides, Watson and Crick model of DNA, **RNA**- it's type along with functions	12
3	**Elementary knowledge of enzymes -** Classification, mechanism of enzyme action, Factors affecting activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.	8
4	**Biological oxidation** - Brief concept of biological oxidation: Definition of Oxidative phospoylation Electron transport chain. Inhibitors and Uncouplersbriefly	5
5	**Metabolism of Carbohydrate**:Glycolysis, TCA cycle, Definition and significance of glycogenesis and glycogenolysis. Definition and significance of HMP shunt, definition and significance of gluconeogenesis. Regulation of blood Glucose level, Diabetes Mellitus, Glycosuria.Glucose Tolerance Test. **Metabolism of Proteins**: Transamination, Transmethylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing aminoacids. **Metabolism of Lipid:**Outline of beta oxidation with energetic, Ketone bodies (Enumerate) and its importance. Functions of cholesterol and its biomedical significance. Lipid profile and its diagnostic importance. Fatty liver, lipotropic factor, atherosclerosis. **Metabolism of Nucleic acid**:Purinecatabolism (Formation of uric acid), Gout	14
6	**Vitamins and Minerals-** RDA, Sources, functions and deficiency manifestations of Fat soluble vitamins. RDA, sources, functions and deficiency manifestations of Water soluble vitamins. RDA, Sources, functions and deficiency manifestations of Calcium, Phosphorous, Iron, Iodine	5
7	**Principle and applications of :**Colorimeters, pH Meter	5
8	**Pre examination Skills -** Collection and preservation of samples (Anticoagulants), transportation & separation of biological specimens, Sample rejection criteria, Disposal of biological Waste materials.	5
9	**Nutrition:** History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet planning, Assessment of nutritional status, **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, Role of essential nutrients in the balanced diet	5
Total		**60 hrs**

BO1.3 P – General Biochemistry (Demonstration)

Sr. No.	Topics	No. of Hrs
1	Introduction to Personnel protective equipments used in laboratory and their importance (LCD)	60
2	Handling of colorimeters – operation and maintenance (LCD)	
3	Serum electrolytes measurement (only demo)	
4	Demonstration of semi automated / fully automated blood analyser	
5	Demonstration of tests for carbohydrates (Monosacchrides, disaccharides and polysaccharides)	
6	Precipitation Reactions of protein (only demonstration)	
7	Test on bile salts (only demonstration)	
8	Tests on Normal constituents of Urin (only demo)	
9	Tests on Abnormal constituents of Urin (only demo)	
Total		**60 hrs**

Textbooks:

1. Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by PrafulGhodkar
2. Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by PrafulGhodkar
3. Medical Laboratory Technology (Volume 1): Procedure Manual for RoutineDiagnostic, Kanai Mukharjee
4. Medical Laboratory Technology (Volume 2): Procedure Manual for RoutineDiagnostic, Kanai Mukharjee
5. Medical Laboratory Technology (Volume 3): Procedure Manual for RoutineDiagnostic, Kanai Mukharjee
6. Essentials of Biochemistry, Second Edition, Dr.(Prof) Satyanarayana
7. Essentials of Biochemistry, 2nd Edition, Dr. PankajaNaik
8. Principles and Techniques of Biochemistry and Molecular Biology, 5Th Edition, Wilson &Walker

Reference books:

1. An Introduction to Chemistry, 8thEdition by Mark Bishop
2. Clinical Chemistry made easy, 1stEidtion by Hughes
3. Tietz Fundamentals of Clinical Chemistry , 7th Edition by Carl Burtis

BO1.4 Introduction to National Health care system (Multidisciplinary/Interdisciplinary)

Teaching Objective	• To teach the measures of the health services and high-quality health care • To understand whether the health care delivery system is providing high-quality health care and whether quality is changing over time. • To provide to National Health Programme- Background objectives, action plan, targets, operations,in various National Heath Programme. • To introduce the AYUSH System of medicines.
Learning Outcomes	• The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to healthcare delivery system** - Healthcare delivery system in India at primary, secondary and tertiary car; Community participation in healthcare delivery system; Health system in developed countries; Private / Govt Sector; National Health Mission; National Health Policy; Issues in Health Care Delivery System in India	10
2	**National Health Programme-** Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	8
3	**Introduction to AYUSH system of medicine -** Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of medicine	8
4	**Health scenario of India-** past, present and future	4
5	**Demography & Vital Statistics-** Demography – its concept; Census & its impact on health policy	5
6	**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.	10
Total		**45 hrs**

Books:

1. National Health Programs Of India National Policies and Legislations Related to Health: 1 J. Kishore (Author)
2. A Dictionary of Public Health Paperback by J Kishor
3. Health System in India: Crisis & Alternatives , National Coordination Committee, Jan SwasthyaAbhiyan
4. In search In Search of the Perfect Health System
5. Central Bureau of Health Intelligence (1998). Health Information of India, Ministry of Health and Family Welfare, New Delhi.
6. Goyal R. C. (1993). Handbook of Hospital Personal Management, Prentice Hall of India, New Delhi, 17–41. Ministry of Health and Family Welfare (1984). National Health Policy, Annual Report (1983–4), Government of India, New Delhi
7. Historical Development of Health Care in India, Dr. Syed Amin Tabish,
8. cultural Competence in Health Care by Wen-Shing Tseng (Author), Jon Streltzer (Author)
9. Do We Care: India's Health System by K. Sujatha Rao (Author)

BO1.5 P - Community Orientation &Clinical Visit (including related practical's to the parent course) (Total -120 hrs.)

ABILITY ENHANCEMENT ELECTIVE COURSE
BO1.6 English and Communication Skills

Teaching Objective	• This course deals with essential functional English aspects of the of communication skills essential for the health care professionals. • To train the students in oral presentations, expository writing, logical organization and Structural support.
Learning Outcomes	• Able to express better. • Grow personally and professionally and Develop confidence in every field

Sr. No.	Topics	No. of Hrs.
1	**Basics of Grammar** - Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	6
2	**Basics of Grammar – Part II** - Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	6
3	**Writing Skills** - Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension	3
4	Writing and Reading, Summary writing, Creative writing, news paper reading	3
5	Practical Exercise, Formal speech, Phonetics, semantics and pronunciation	5
6	**Introduction** to communication skills - Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals	6
7	**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	4
8	**Listening** - Importance of listening , Self assessment, Action plan execution, Barriers in listening, Good and persuasive listening	4
9	**Reading** - What is efficient and fast reading , Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study	4
10	**Non Verbal Communication** - Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice	4
Total		**45 hrs**

Text books:

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

BO1.7 Environmental Sciences

Teaching Objective	• To understand and define terminology commonly used in environmental science • To teach students to list common and adverse human impacts on biotic communities, soil, water, and air Quality. • To understand the processes that govern the interactions of organisms with the biotic and abiotic. • Understand the relationship between people and the environment; Differentiate between key ecological terms and concepts
Learning Outcomes	• Current environmental issues and highlight the importance ofadopting an interdisciplinary approach. • Sample an ecosystem to determine population density and distribution. • Create food webs and analyse possible disruption of feeding relationships.

Sr. No.	Topics	No. of Hrs.
1	**Components of Environment** – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;	4
2	**Ecosystem** : Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems,	5
3	**Global Environmental Problems** – Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.	4
4	**Environmental pollution and degradation** – Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies; perspectives of pollution in urban, industrial and rural areas. Habitat Pollution by Chlorinated Hydrocarbons (DDT, PCBs, Dioxin etc, Endocrine disrupting chemicals, Nutrient pollution.	8
5	**Environmental Management** – Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.	6
6	**Environmental Protection Act** – Environmental Laws, national movements, environmental ethics – holistic approach of environmental protection and conservation, IUCN – role in environmental protection. Concept with reference to UN – declaration, aim and objectives of human right policies with reference to India, recent north-south debate on the priorities of implementation, Environmental Protection Agency (EPA)	10
7	**Bioremediation** – Oil spills, Wastewater treatment, chemical degradation, heavy Metals.	8
Total		**45 hrs**

Books:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., &Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. &Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

SEMESTER- II

BO 2.1 Human Anatomy- Part II

Teaching Objective	• To teach the students the basic anatomy of Reproductive , Lymphatic Endocrine ,Nervous system and Special senses
Learning Outcomes	• Demonstrate and understand the basic anatomy of Reproductive and Lymphatic system. • Demonstrate and understand the basic anatomy of Endocrine ,Nervous system • Demonstrate and understand the basic anatomy of Special senses

Sr. No.	Topics	No. of Hrs.
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	6
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	5
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	4
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	12
5	**Sensory system -** Eye (Gross anatomy), Ear	3
Total		**30 hrs**

BO 2.1 P - Human Anatomy Part II (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	60
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain ,Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	
5	**Sensory system -** Eye (Gross anatomy), Ear	
Total		**60 hrs**

Textbooks:

1. Manipal Manual of Anatomy for Allied Health Sciences courses:Madhyastha S.
2. G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology
3. B.D. Chaurasia: Handbook of General Anatomy

Reference books:

1. B.D. Chaurasia : Volume I-Upper limb & Thorax, Volume II- Lower limb, Abdomen & Pelvis Volume III- Head, Neck, Face Volume IV- Brain-Neuroanatomy
2. Vishram Singh: Textbook of Anatomy Upper limb & Thorax Textbook of Anatomy Abdomen & Lower limb Textbook of Head neck and Brain
3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; ChurchillLivingstone.
4. T.S. Ranganathan : Text book of Human Anatomy
5. Inderbirsingh, G P Pal : Human Embryology
6. Textbook of Histology, A practical guide:- J.P Gunasegaran

BO 2.2 Human Physiology Part II

Teaching Objective	• To teach basic physiological concepts related to Renal physiology, Endocrinology& Reproductive physiology, CNS, Special senses
Learning Outcomes	• To understand the basic physiological concepts of Renal physiology • To understand the basic physiological concepts of Endocrinology & Reproductive physiology • To understand the basic physiological concepts of CNS, Special senses,

Sr. No.	Topics	No. of Hrs.
1	**Nervous system** -Functions of Nervous system , Neuron – Conduction of Impulses, factors affecting, Synapse- transmission, Receptors, Reflexes Ascending tracts, Descending tracts, Functions of various parts of the Brain. Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture, Autonomic Nervous System (ANS): Functions.	10
2	**Special senses-** Vision: Structure of Eye, functions of different parts, Refractive errors of Eye and correction, Visual Pathway, Colour vision & tests for colour Blindness, Hearing: Structure and function of ear, Mechanism of Hearing, Tests for Hearing (Deafness)	6
3	**Skin -** Structure and function, Body temperature,Regulation of Temperature & fever.	4
4	**Endocrine System -** Short description of various endocrine glands and their functions	2
5	**Reproductive systems -** Structure & Functions of Reproductive system, Male Reproductive System: spermatogenesis, Testosterone, Female reproductive system: Ovulation, Menstrual cycle, Oogenesis, Tests for Ovulation, Oestrogen&Progesterone , Pregnancy test, Parturition. Contraceptives, Lactation: Composition of Milk, advantages of breast Feeding.	4
6	**Excretory System** General Introduction, structure & functions of kidney, Renal circulation, Glomerular filtration & tubular reabsorption, Nephron, Juxta Glomerular Apparatus, Mechanism of Urine formation, Micturition, Cystomatrogram. Diuretics, Artificial Kidney.	4
Total		**30 hrs**

BO 2.2P - Human Physiology Part II – (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Recording of body temperature	30
2	Examination of sensory system	
3	Examination of motor system	
4	Examination of Eye	
5	Examination of ear	
Total		**30 hrs**

Textbooks:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books:

1. Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
   Comprehensive textbook of Medical
   Physiology Volume I & II – Dr. G. K. Pal

BO 2.3 General Microbiology

Teaching Objective	• To introduce basic principles and then applies clinical relevance in four segments of the academic preparation for paramedical: immunology, bacteriology, mycology, and virology. This rigorous course includes many etiological agents responsible for global infectious diseases.
Learning Outcomes	• Upon completion, students should be able to demonstrate knowledge of microorganisms and the disease process as well as aseptic and sterile techniques. • Perform microbiological laboratory procedures according to appropriate safety standards

Sr. No.	Topics	No. of Hrs.
1	**Concepts and Principles of Microbiology -** Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.	4
2	**General Characters of Microbes -** Morphology, staining methods, Bacterial growth & nutrition, Culture media and culture methods +ABS, Collection of specimen, transport and processing, Antimicrobial mechanism and action, Drug Resistance minimization.	6
3	**Sterilization and Disinfection -** Concept of sterilization, Disinfection asepsis, Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterlization, Biological waste and Biosafety & Biohazard.	5
4	**Infection and Infection Control -** Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control	3
5	**Immunity -** Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions – Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaris – Types of vaccines, cold chain, Immunization Schedule.	6
6	**Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests) –** Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraecea& Gram negative bacilli, Mycobacteria, Anaerobic bacteria &Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye.	7
7	**Mycology -** Introduction, Classification, outline of lab diagnosis, List of Fungi causing:Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic , Fungi.	3
8	**Virology -** Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis& Classification, HIV Virus, Hepatitis -B Virus.	4
9	**Parasitology** – Morphology, Life Cycle & Outline of Lab Diagnosis & Classification, Common parasite infection of eye, Protozoa- E, histolytica, Malarial Parasite, General properties, classification, list of diseases caused by: Cestodes and Trematodes, Intestinal Nematodes & Tissue Nematodes, Vectors.	7
Total		**45 hrs**

BO 2.3P - General Microbiology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Concepts and Principles of Microbiology	60
2	General Characters of Microbes	
3	Sterilization and Disinfection	
4	Infection and Infection Control	
5	Immunity	
6	Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)	
7	Mycology	
8	Virology	
9	Parasitology	
Total		**60 hrs**

Text Book:

1. Text Book of Microbiology for Nursing Students, AnantNarayanPanikar
2. Text Book of Ophthalmology, Khurana

Reference Book:

1. Text Book of Microbiology, Baveja.

BO 2.4 Basic Pathology & Hematology

Teaching Objective	• Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis • Describe normal and disordered hematopoiesis • Develop implement and monitor a personal continuing education strategy and critically appraise sources of pathology related medical information. • Describe mechanisms of oncogenesis &demonstrate an understanding of genetics and cytogenetics pertaining to hematology
Learning Outcomes	• The student should submit the appropriate tissue sections per protocol to demonstrate the lesion and other clinically-relevant information needed for the final pathologic report • To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Pathology	1
2	Working and maintenance of instruments	2
3	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	10
4	General principles of Histopathology techniques collection, fixation, processing & routine staining	3
5	General principles of Cytopathology techniques collection, fixation, processing & routine staining	5
6	General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	10
7	General principles of Blood Bank techniques antigen, antibody, ABO & Rh system	5
8	General principles of Autopsy & Museum	4
9	**General Pathology including introduction to :** I) Cell Injury (Reversible, Irreversible cell injury) II) Inflammation(Acute inflammation, cells, Chronic inflammation, granuloma and examples III) Circulatorydisturbances(Thrombosis, Embolism ,Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features, And distinguishing features) IV) Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions)	8
10	**Systemicpathologybasis andmorphologyof common disorders like** I) Anemia(types-Iron deficiency, megaloblastic, Aplastic-Etiology, Pathogenesis Investigation)- II) Leukemia (Acute and chronic, Peripheral smear), AIDS(Definition, Pathogenesis, Mode of transmission, Two Confirmatory test Tridot, Western blot), Hepatitis (Types, Etiology, Mode of spread) III) Malaria-(Mode of spread IV) Tuberculosis-(Primary and secondary tb, Granuloma formation, Mode of transmission, Organs involved	8

11	Maintenance and medicolegal importance of records and specimens, Lab information system(LIMS)	3
12	Biomedical Waste, Universal Safety Precaution(Protocol to be followed after -Needle injury, chemical injury	1
Total		**60 hrs**

BO 2.4P – Basic Pathology & Hematology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Working and maintenance of instruments,	60
2	General principles of Haematology techniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	
3	Generalprinciplesof Histopathologytechniques collection, fixation, processing & routine staining	
4	General principles of Cytopathology techniques collection, fixation, processing & routine staining	
5	General principles of Clinical Pathology techniques samplecollection, processingforroutine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	
6	Generalprinciplesof BloodBanktechniques antigen, antibody, ABO & Rh system	
7	General principles of Autopsy & Museum	
Total		**60 hrs**

Reference Books:

1. A *Handbook of Medical* Laboratory (Lab) Technology: *Editor*) *Second Edition*. *V.H. Talib* (Ed.).
2. Comprehensive Textbook Of Pathology For Nursing: Pathology Clinical Pathology Genetics. Ak Mandal Shramana Choudhury, Published by Avichal Publishing Compnay | Language English
3. Textbook of Medical Laboratory Technology- PrafulB. Godkar, Darshan P. Godkar
4. Medical Laboratory Technology. Methods and Interpretations – RamnikSood (volume1&2)
5. Medical Laboratory technology a procedure manual for routine diagnostic test – vol – I, II, III. Kanai L. Mukharjee Tata Mc graw hill pub. New Delhi.
6. Practical Pathology P. Chakraborty Gargi Chakraborty New Central Book Agency, Kolkata.
7. Theory & Practice of Histological Techniques John D. Bancroft et.al. Churchill Livingstone Printed in China.
8. Histochemistry in Pathology M.I. Filipe et.al. Churchill Livingstone, London
9. Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling Butterworths Company Ltd. London.
10. A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib.

BO 2.5 Introduction to Quality and Patient safety

Teaching Objective	• The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. • To understand the basics of emergency care and life support skills. • To Manage an emergency including moving a patient • To help prevent harm to workers, property, the environment and the general public. • To provide a broad understanding of the core Course areas of infection prevention and control.•To provide knowledge on the principles of on-site disaster management
Learning Outcomes	• Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels.

Sr. No.	Topics	No. of Hrs.
1	**Quality assurance and management** – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	7
2	**Basics of emergency care and life support skills** - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR	7
3	**Bio medical waste management and environment safety** -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)	8
4	**Infection prevention and control** - Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control	8
5	**Antibiotic Resistance** - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance	8
6	**Disaster preparedness and management** - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.	7
Total		**45 hrs**

Reference Books:

1. Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author)
2. Understanding Patient Safety, Second Edition by Robert Wachter (Author)
3. HandbookofHealthcareQuality& Patient SafetyAuthor : Girdhar J Gyani, Alexander Thomas
4. Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, LeneSchibevaag
5. Old) Handbook Of Healthcare Quality & Patient Safety by GyaniGirdhar J(Author)
6. Handbook of Healthcare Quality & Patient Safety by .Gyani G J/Thomas A
7. Quality Management in Hospitals by S. K. Jos

BO 2.6P - Community orientation & clinical visit (including related practicals to the parent course) (Total-120hrs)

SKILL ENHANCEMENT ELECTIVE COURSE

BO 2.7 Medical Bioethics & IPR

Teaching Objective	• To introduce the wide range of ethical issues in health care. • To provide basic skills in: A) Approaching ethical issues. B) Analysis and statement of issues. C) Understanding the relevant ethical principles invoked. • Imparting knowledge and skills that will enable students to develop ethical answers to these issues • To acquire acquire specialized knowledge of law and IPR. • The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
Learning Outcomes	• Upon successful completion of the course, students will be able to: Recognize what constitutes an ethical concern in health care • Understanding ethical issues in Health care. • Understand better the complexity and multi-dimensionality of medical ethical concerns and uniqueness of each problem. • Capacity to rationally justify your decision • Develop the ability to reason through difficult medical/clinical ethical issues both orally, in the context of a group of their peers, and through written • The students get awareness of acquiring the patent and copyright for their innovative works. •They also get the knowledge of plagiarism in their innovations which can be questioned legally.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to Bioethics** Bioethical issues related to Healthcare &medicine .	5
2	**Anatomy -** Cadaver ethics, Human dignity, PNDT, Disposal of cadaver, Genetic Counselling	7
3	**Physiology -** Animal ethics, Health policy privacy	7
4	**Biochemistry & Pathology -** Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion	5
5	**Pharmacology -** Rational drug prescribing, Clinical trials, Risk minimization, Animal ethics	5
6	**Microbiology -** Hand wash, Drug resistance minimization, Prudence of investigation confidentiality, Sterilization procedure, Biosafety and bio hazard	5
7	**Medicolegal aspects of medical records**	3
8	**Introduction to Intellectual Property**: Concept of Intellectual Property Kinds of Intellectual Property Patents, Copyrights Designs, Trademarks,Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types	8
Total		**45 hrs**

Reference Books:

1. Contemporary issues in bioethics – Beauchamp &walters (B&W) 4th edition.
2. Classic philosophical questions by Gloud (8th Edition)
3. Case book series and booklets by UNESCO Bioethics Core curriculum 2008
4. Encyclopedia of Bioethics 5 vol set, (2003) ISBN-10: 0028657748
5. Intellectual property rights- Ganguli-Tat McGrawhill. (2001) ISBN-10: 0074638602,
6. Intellectual Property Right- Wattal- Oxford Publicatiopn House.(1997) ISBN:0195905024.

BO 2.8 Human Rights &Professional Values

Teaching Objective	• To understand interaction between society and educational institutions. • To sensitize the citizens so that the norms and values of human rights and duties of education programme are realized. • To encourage research activities. • To encourage research studies concerning the relationship between Human Rights and Duties Education.
Learning Outcomes	•This course will aim at making the learners acquire conceptual clarity and develop respect for norms and values of freedom, equality, fraternity and justice. • It will include awareness of civil society organizations and movements promoting human rights. • This will make the students realize the difference between the values of human rights and their duties

Sr. No.	Topics	No. of Hrs.
1	**Background -** Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights	6
2	**Human rights at various level**- Human Rights at Global Level UNO, **Instruments**: U.N. Commission for Human Rights,European Convention on Human Rights.	6
3	**Human rights in India -** Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman	7
4	**Human Rights Violations -** Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.	6
5	**Professional values**- Integrity, Objectivity, Professional competence and due care, Confidentiality	6
6	**Personal values**- ethical or moral values, Attitude and behavior- professional behavior, treating people equally	6
7	**Code of conduct-** professional accountability and responsibility, misconduct, Cultural issues in the healthcare environment	8
Total		**45 hrs**

Reference Books:

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
2. Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

SEMESTER-III

BO 3.1 Physical Optics

Teaching Objective	• 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.
Learning Outcomes	• 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 willbe dealt with in detail.

Sr. No.	Topics	No. of Hrs.
1	Nature of light –light as electromagnetic oscillation –wave equation;	3
2	ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase,	8
3	Sources of light; Electromagnetic Spectrum, Polarized light; linearly polarized light; and circularly polarized light, Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle, Birefringence; ordinary and extraordinary rays, Relationship between amplitude and intensity, Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture; Airy's disc, Resolution of an instrument (telescope, for example); Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence,	17
4	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers, Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units, Inverse square law of photometry; Lambert's law,	13
5	Other units of light measurement; retinal illumination; Trolands	4
Total		**45 hrs**

BO 3.1P - Physical Optics

Sr. No.	Topics	No. of Hrs.
1	Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp	60
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	
Total		**60 hrs**

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

Reference books:

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

BO 3.2 Geometrical Optics

Teaching Objective	• 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.
Learning Outcomes	• This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behavior 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.

Sr. No.	Topics	No. of Hrs.
1	**Geometrical Optics I** - Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index, Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance, Refractive index; its dependence on wavelength,	5
2	Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles, Plane mirrors –height of the mirror; rotation of the mirror,	2
3	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation, Imaging by concave mirror, convex mirror, Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface, Glass slab; displacement without deviation; displacement without dispersion, Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism, Prisms; angular dispersion; dispersive power; Abbe's number, Definition of crown and flint glasses; materials of high refractive index,	5
4	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index, Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula, Paraxial approximation; derivation of vergence equation, Imaging by a positive powered surface and negative powered surface, Vergence at a distance formula; effectivity of a refracting surface,	5
5	Definition of a lens as a combination of two surfaces; different types of lens shapes, 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,	6

6	Newton's formula; linear magnification; angular magnification, Nodal Planes, Thin lens as a special case of thick lens; review of sign convention, Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions, Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions, Prentice's Rule, System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points, System of more than two thin lenses; calculation of equivalent power using magnification formula	6
7	**Geometrical Optics II -** Vergence and vergence techniques revised, Gullstrand's schematic eyes, visual acuity, Stile Crawford, Emmetropia and ametropia, Blur retinal Imaginary, 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,	5
8	Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification,	3
9	Aperture stops- entrance and exit pupils,	2
10	Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens,	2
11	Accommodation –Accommodation formulae and calculations, Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field,	2
12	Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications, Visual optics of aphakia and pseudophakia.	2
Total		**45hrs**

BO 3.2P Geometrical Optics

Sr. No.	Topics	No. of Hrs.
1	Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index	60
2	Thin Prism – measurement of deviation; calculation of the prism diopter, Image formation by spherical mirrors	
3	Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula	
4	Concave lens – in combination with a convex lens – power determination.	
5	Construction of a tabletop telescope – all three types of telescopes - Construction of a tabletop microscope	
6	Imaging by a cylindrical lens – relationship between cylinder axis and image orientation,	
7	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,	
8	Imaging by a spherocylindrical lens – sphere and cylinder in contact	
9	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	
Total		**60 hrs**

Text book:

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

Reference books:

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

BO 3.3 Visual Optics I/II

Teaching Objective	• Upon completion of the course, the student should be able: • To understand the fundamentals of optical components of the eye • To gain theoretical knowledge and practical skill on visual acuity measurement, objective and Courseive clinical refraction
Learning Outcomes	• 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.

Sr. No.	Topics	No. of Hrs.
1	**Review of Geometrical Optics: Vergence and power:**Conjugacy, object space and image space**,** Sign convention**,** Spherical refracting surface**,** Cardinal points**,** Magnification**,** Light and visual function**,** Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Aberration and application Spherical and Chromatic	17
2	**Optics of Ocular Structure :**Cornea and aqueous **,** Crystalline lens**,** Vitreous Schematic and reduced eye	16
3	**Measurements of Optical Constants of the Eye:** Corneal curvature and thickness**,** Keratometry**,** Curvature of the lens **,** Axial length and axis of the eye**,** Basic Aspects of Vision.**,** Visual Acuity**,** Light and Dark Adaptation**,** Color Vision**,** Spatial and Temporal Resolution	15
4	**Refractive anomalies and their causes:** Etiology of refractive anomalies**,** Contributing variability and their ranges**,** Growth of the eye in relation to refractive errors	12
Total		**60 hrs**

BO 3.3P - Visual Optics I/II

Sr. No.	Topics	No. of Hrs.
1	Study of Purkinje image II and I.	60
2	Study of Purkinje image III and IV.	
3	Measurement of corneal curvature	
4	Measurement of corneal thickness	
5	Assessment with schematic eye	
6	Conjugate points – demonstration- worked examples	
7	Visual acuity charts	
8	Vision through pinhole, slit, filters, etc.	
9	Visual acuity, stereo acuity in emmetropia	
10	Myopia and pseudomyopia, myopia and visual acuity	
11	Myopic correction- Courseive verification and monocular and binocular	
12	Hypermetropia – determination of manifest error Courseively	
13	Hypermetropic correction- Courseive verification	
14	Demonstration of astigmatism: Use of slit and keratometry to find the principal meridians	
Total		**60 hrs**

Text books (Visual Optics I & II)

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

Reference books (Visual Optics I & II)

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

BO 3.4 Ocular Diseases I

Teaching Objective	At the end of the course the students will be knowledgeable inthe following aspects of ocular diseases: knowledge ,on the etiology, epidemiology, symptoms, signs, course sequelae of ocular disease, diagnostic approach, and management of the ocular diseases.
Learning Outcomes	This course deals with various ocular diseases affectingvarious parts of the eyes. It covers clinical signs and symptoms, cause,pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

Sr. No.	Topics	No. of Hrs.
1	**Orbit :**Applied Anatomy**,** Proptosis (Classification, Causes, Investigations) **,** Enophthalmos**,** Orbital Inflammations (Preseptal cellulites, Orbital cellulitis cavernous sinus Thrombosis) **,**Grave's Ophthalmopathy**,** Orbital blowout fractures**,** Approach to a patient with proptosis	10
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, Internalhordeolum,, MolluscumContagiosum) **,** 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)	10
3	**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)	10
4	**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	10
5	**Cornea :**Applied Anatomy and Physiology,Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)**,** Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative**,** Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))**,** Keratoconus, Keratoglobus**,** Corneal oedema, Corneal opacity, Corneal vascularisation**,** Penetrating Keratoplasty	10
6	**Uveal Tract and Sclera :**Applied Anatomy, Classification of uveitis, EtiologyPathology **,**Anterior Uveitis**,** Posterior Uveitis**,** Purulent Uveitis**,** Endophthalmitis**,** Panophthalmitis**,** Pars Planitis**,** Episcleritis and scleritis**,** Clinical examination of Uveitis and Scleritis	10
Total		**60 hrs**

Books:
Text book:

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

Reference books:

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

BO 3.5 Clinical Examinations and Visual Systems

Teaching Objective	At the end of the course the students will be skilled in knowingthe 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.
Learning Outcomes	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.

Sr. No.	Topics	No. of Hrs.
1	History taking, Visual acuity estimation , Extra ocular motility, Cover teat, Alternating cover test, Hirschberg test, Modified Krimsky, Pupils Examination, Maddox Rod,	8
2	**Van Herrick**- External examination of the eye, Lid Eversion ,Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), Color Vision, Stereopsis, Confrontation test	10
3	Photostress test, Slit lamp biomicroscopy, Ophthalmoscopy, Tonometry, ROPLAS, Amsler test	5
4	Contrast sensitivity function test, Saccades and pursuit test	7
Total		**30 hrs**

BO 3.5P - Clinical Examinations and Visual systems

Sr. No.	Topics	No. of Hrs.
1	Recording visual acuity for distance and near	60
2	Examining color vision using Ishihara chart	
3	Recording Visual acuity using various methods	
4	Confrontation test	
5	Lacrimal function test – Tear BUT, Schirmer' test	
6	All Objective method of refraction – retinoscopy, Auto – refractor, Keratometer etc.	
7	Recording history with respect to optical, medical, family, chief complain etc.	
8	Cover tests	
9	Amsler test	
10	Schiotz Tonometry	
Total		**60 hrs**

Text book:

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

Reference books

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

GENERIC ELECTIVE COURSE

BO 3.6 Pursuit of Inner Self Excellence (POIS)

Teaching Objective	• To inculcate moral values in students – Self-Discipline , Time Management, Develop attitude of Service with humility, Empathy, Compassion, brotherhood, Respect for teachers, colleagues & society members. • Develop Effective means of communication & presentation skills in students • To develop wisdom in students for deciding their career based on their areas of interest and inner skills. • Introduce techniques for Relaxation, Meditation & Connecting with innerself. • Rejuvenation Techniques which can be used by students to distress themselves • To improve performance of students during various assignments, projects, elocutions, events, quiz, interviews.
Learning Outcomes	• Students will become self dependent, more decisive and develop intuitive ability for their study and career related matter. • Student's ability to present their ideas will be developed. • Enhanced communication skills, public speaking & improved Presentation ability. • Students will be able to explore their inner potential and inner ability to become a successful researcher or technician & hence become more focused. • Students will observe significant reduction in stress level. • With the development of personal attributes like Empathy, Compassion, Service, Love & brotherhood, students will serve the society and industry in better way with teamwork and thus grow professionally.

Sr. No.	Topics	No. of Hrs.
1	**Spiritual Values for human excellence :** The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali'sAshtanga Yoga ,Vedic education - The role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddism, etc.; Why spirituality? Concept – significance ; Thought culture	10
2	**Ways and Means :** Correlation between the values and the Courses ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values -Role of the living Master	15

3	**Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny	10
4	**Experiencing through the heart for self-transformation(Heartfulness Meditation):** Who am I? ; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of egregore effect;	10
Total		45 hrs

Books:

- The Art of Learning: **A Journey in the Pursuit of Excellence,** Josh Waitzkin, Simonand Schuster, 2007
- Reality at Dawn. By Shri Ram Chandra, Published by ISRC

BO 3.7 Organizational Behavior

Teaching Objective	• To understand the initial insights into underlying principles and fundamental theories of organizational behaviour. • The Student should develop a sense of what falls under the domain of organizational behaviour. • He should develop an understanding of academic views on the behaviour and motivations of people in organizations and the purposes of organizations. • This course clearly takes an academic and scientific lens with the aim of understanding human behaviour in organizations.
Learning Outcomes	• Describe and apply motivation theories to team and organizational scenarios in order achieve a team's or an organization's goals and objectives. • Explain the effect of personality, attitudes, perceptions and attributions on their own and other's behaviours in team and organizational settings. • Explain types of teams and apply team development, team effectiveness, and group decision making models and techniques. Analyse and apply leadership theories and better understand their own leadership style.

Sr. No.	Topics	No. of Hrs.
1	Organizational Behavior - Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive	6
2	**Organization Structure and Design** - Authority and Responsibility Relationships - Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design - Mechanistic vs Adoptive Structures – Formal and Informal Organization	8
3	Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management	6
4	Learning - Process of Learning - Principles of Learning - Organizational Reward Systems - BehavioralManagement	6
5	Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity - MoraleIndicators	6
6	Leadership - Definition - Importance - Leadership Styles - Models and Theories of LeadershipStyles	7
7	Conflict Management - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructiveconflict	6
Total		**45 hrs**

Books:

1. Organizational Behavior, 9th Ed. - Stephen Robbins
2. Human Behaviour at work - Davis and Newstorm
3. Organizational Behaviour - Uma Sekaran
4. Organizational Behaviour - Fred Luthans
5. Organizational Behaviour - K.Aswathappa
6. Human Behaviour at Work - Keith Davis
7. Organizational Behaviour - Jit S.Chandran
8. Human Relations & Organizational Behaviour - R.S.Dwivedi
9. Organizational Behaviour - McShane

SEMESTER-IV

BO 4.1 Optometric Optics I & II

Teaching Objective	Skills/knowledge to be acquired at the end of this course: • Measurement of lens power , lens centration using conventional techniques • Transposition of various types of lenses • Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.) • Knowledge to select the tool power for grinding process. • Measurement of surface powers using lens measure. • Method of laying off the lens for glazing process. • Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms. • Knowledge of prism and decentration in ophthalmic lenses • Knowledge of different types of materials used to make lenses and its characteristics • Knowledge lens designs – single vision, bifocals, progressive lens • Knowledge on tinted and protective lenses • Knowledge of progressive lens fitting and solving of trouble shooting • Knowledge on special lenses like iseikonic, spectacle magnifiers. Knowledge on spectacle frames – manufacture, materials
Learning Outcomes	• 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.

Sr. No.	Topics	No. of Hrs.
1	**Introduction** –Light, Mirror, Reflection, Refraction and Absorption,	3
2	**Prisms** –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms,	3
3	**Lenses** –Definition, units, terminology used to describe, form of lenses ,Vertex distance and vertex power.	3
4	**Lens shape**, size and types i.e .spherical, cylindrical and Sphero-cylindrical	2
5	**Transpositions** –Simple, Toric and Spherical equivalent.	2
6	**Prismatic effect**, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero cylinder lenses.	2
7	**Magnification in high** plus lenses, Minification in high minus lenses**.**	2
8	**Tilt induced power in spectacles.**	2
9	**Aberration in Ophthalmic Lenses**	1
10	**Spectacle Lenses -** II: Manufacture of glass, Lens materials,	2

11	**Lens surfacing(only theory),** **Principle of surface generation and glass cements(only theory), Terminology used in Lens workshop(only theory),**	5
12	Lens properties, Lens quality, Faults in lens material, Faults on lens surface,	2
13	**Methods of Inspecting the quality of lenses(only theory),** Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)	4
14	**Spectacle Frames:** Types and parts, Classification of spectacle frames-material, weight, temple position, Coloration,	4
15	**Frame construction(only theory),** Frame selection, Size, shape, mounting and field of view of ophthalmic lenses	4
16	**Tinted & Protective Lenses:** Characteristics of tinted lenses Absorptive Glasses, Polarizing Filters, Photochromic & Reflecting filters, Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lense	5
17	**Multifocal Lenses**: Introduction, history and development, types, Bifocal lenses, Trifocal & Progressive addition lenses	4
18	**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	5
19	**Miscellaneous Spectacle**: Iseikonic lenses, Spectacle magnifiers, Recumbent prisms Fresnel prism and lenses,Lenticular & Aspherical lenses,High Refractive index glasses	5
Total		60 hrs

BO 4.1P - Optometric Optics I & II

Sr. No.	Topics	No. of Hrs.
1	Hand Neutralization of Ophthalmic lenses	**90**
2	Transposition – Simple and Toric prescription	
3	Measurement of Inter Pupillary Distance	
4	Solving problems of vergence calculation	
5	Use of lensometer for spherical lenses & cylindrical lenses – Power and center marking	
6	Solving problems on centration &decentration	
7	Using Geneva Lens measure to find out surface power of lenses	
8	Use of lensometer for finding out power of all type of lenses, marking – center, axis , measuring power of prism.	
9	Progressive Lenses - Measurement	
10	Progressive Lenses - Fitting	
11	Progressive Lenses - Verification	
12	Progressive Lenses - Trouble Shooting	
Total		**90 hrs**

Text book/reference books:

- Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
- Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth–Heinemann, 1996
- Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

Reference books (Optometric Optics I):

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

BO 4.2 Ocular Diseases II & Glaucoma

Teaching Objective	At the end of the course the students will be knowledgeable in the following aspects of ocular diseases of the posterior segment and knowledge on the etiology, epidemiology, symptoms, signs, course sequelae of ocular disease, diagnostic approach, and management of the ocular diseases and glaucoma
Learning Outcomes	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.

Sr. No.	Topics	No. of Hrs.
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.RetinalDetachement: Rhegmatogenous, Tractional, Exudative),Retinablastoma, Diabetic retinopathy	10
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	10
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,Lenscoloboma, Lenticonus, Microsperophakia.;	10
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	10
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	5
Total		**45 hrs**

Text book:

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

Reference books:

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

BO 4.3 Dispensing Optics

Teaching Objective	•This course will deal with the dispensing aspects of spectacle lenses and frames needed to manage the customer in an Optical set up, from counseling to delivering the spectacles.
Learning Outcomes	Skills to be acquired at the end of this course • Reading of spectacle prescription • Counseling the patient • Lens edge thickness calculation • Frame & lens measurements and selection • Writing spectacle lens order • Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives) • Lens verification and axis marking and fitting of all lens types • Final checking of finished spectacle with frame adjustments • Delivery and follow-up • Troubleshooting complaints and handling patient's questions.

Sr. No.	Topics	No. of Hrs.
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation	5
2	Frame selection –based on spectacle prescription, professional requirements, age group,face shape	5
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	2
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt	3
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	5
6	Neutralization –Hand &lensometer, axis marking, prism marking	5
7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)	5
8	Special types of spectacle frames :MonocelesPtosis crutches, Industrial safety glasses, Welding glasses	5
9	Frame availability in Indian market	5
10	FAQ's by customers and their ideal answers	5
Total		**45 hrs**

BO 4.3P - Dispensing Optics

Sr. No.	Topics	No. of Hrs.
1	Transposition – Simple and Toric prescription	**90**
2	Measurement of Inter Pupillary Distance	
3	Solving problems of vergence calculation	
4	Use of lensometer for spherical lenses – Power and center marking	
5	Solving problems on centration &decentration	
6	Using Geneva Lens measure to find out surface power of lenses	
7	Use of lensometer for finding out power of all type of lenses, marking – center, axis , measuring power of prism.	
8	Marking – center, axis by other methods	
9	Hand Neutralization of Ophthalmic lenses	
10	Glazing cutting fitting for various type of lenses	
11	Lens and Frame identification	
Total		**90 hrs**

Text book/reference books:

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

BO 4.4 Optometric Instrumentation

Teaching Objective	Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments: • Visual Acuity chart/drum • Retinoscope • Trail Box • Jackson Cross cylinder • Direct ophthalmoscope • Slit lamp Biomicroscope • Slit lamp Ophthalmoscopy (+90, 78 D) • Gonioscope • Tonometer: Applanation Tonometer • Keratometer • Perimeter • Electrodiagnostic instrument (ERG, VEP, EOG) • A – Scan Ultrasound
Learning Outcomes	This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice.

Sr. No.	Topics	No. of Hrs.
1	Refractive instruments: Optotypes and MTF, Spatial Frequency,	4
2	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,	8
3	Retinoscope – types available, Adjustment of Retinoscopes- special features, Objective optometers.,	5
4	Infrared optometer devices., Projection charts , Illumination of the consulting room., Brightness acuity test, Vision analyzer, Pupilometer, Potential Acuity Meter, Abberometer	8
5	Ophthalmoscopes and related devices :Design of ophthalmoscopes – illumination ,Design of ophthalmoscopes- viewing, Ophthalmoscope disc, Filters for ophthalmoscopy, Indirect ophthalmoscope	8
6	Lensometer, Lens gauges or clock	2
7	Slit lamp	1
8	Tonometers, Keratometer and corneal topography	3
	Refractometer	1
9	Orthoptic Instruments (Synaptophore Only), Color Vision Testing Devices Fields of Vision And Screening Devices, Scans	3
10	ERG	1
11	New Instruments	1
Total		**45hrs**

BO 4.4P - Optometric Instrumentation

Sr. No.	Topics	No. of Hrs.
1	Refractive instruments: Optotypes and MTF, Spatial Frequency(only theory),	30
2	Test charts standards	
3	Retinoscope	
4	Vision analyzer**,** Pupilometer**,** Potential Acuity Meter**,** Abberometer	
5	Ophthalmoscopes and related devices	
6	Lensometer, Lens gauges or clock	
7	Slit lamp	
8	Tonometers, Keratometer and corneal topography	
9	Refractometer	
10	Orthoptic Instruments, Color Vision Testing Devices , Fields of Vision And Screening Devices , Scans	
11	ERG	
Total		**30 hrs**

Text book:

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

Reference books:

- P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo-Optical Instrumentation, 2002
- G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 199

BO 4.5 Basic &Occular Pharmacology

Teaching Objective	At the end of the course, students will acquire knowledge in the following aspects •Basic principle of pharmacokinetics & Pharmacodynamics • Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.
Learning Outcomes	This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

Sr. No.	Topics	No. of Hrs.
1	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis onocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	4
2	Systemic Pharmacology: Autonomic nervous system: Drugsaffecting papillary size and light reflex, Intraocular tension,Accommodation; Cardiovascular system: Anti-hypertensivesand drugs useful in Angina; Diuretics: Drugs used in oculardisorders; Central Nervous System: Alcohol, sedativehypnotics, General & local anesthetics, Opioids &non-opioids;Chemotherapy : Introduction on general chemotherapy,Specific chemotherapy –Antiviral, antifungual, antibiotics;Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	4
3	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharma cokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	4
4	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery,	4
5	Anesthetics used in ophthalmic procedures,	2
6	Anti-glaucoma drugs;	2
7	Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial;	3
8	Drugs used in allergic ,inflammatory& degenerative conditions of the eye;	3
9	Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,	2
10	Antioxidants	2
Total		**30 hrs**

Text book/reference books:

- K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi,2004
- Ashok Garg: Manual of Ocular Therapeutics, Jaypee, NewDelhi, 1996
- T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven, 1997

BO 4.6 CP - Community Orientation &Clinical Visit (including related practical's to the parent course) (Total -225 hrs.)

ABILITY ENHANCEMENT ELECTIVE COURSE

BO 4.7 Computer and applications

Teaching Objective	• Learn IT applications in medicine and allied health care field. • Introduction to health informatics. • Understand the theories and practices adopted in Hospital Information Systems in the light of medical standards, medical data formats and recent trends in Hospital Information Systems.
Learning Outcomes	• Discuss about health informatics and different IT applications in allied health care. • Explain the function of Hospital Information Systems • Analyze medical standards

Sr. No.	Topics	No. of Hrs.
1	Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.	1
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).	3
3	Processor and memory: The Central Processing Unit (CPU), main memory.	4
4	Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.	3
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.).	5
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.	5
7	Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.	5
8	Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.	5
9	Introduction of Operating System: introduction, operating system concepts, types of operating system.	4
10	Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.	5
11	Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.	4
12	Application of Computers in clinical settings.	1
Total		**45 hrs**

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

BO 4.8 Biostatistics and Research Methodology

Teaching Objective	• To enable students to present, analyze and interpret data. • To enable students to use concepts of probability in business situations. • To enable students to make inferences from samples drawn from large datasets. • To enable students to apply univariate and multivariate statistical techniques.
Learning Outcomes	• To understand the importance & Methodology for research • To learn in detail about sampling, probability and sampling distribution, significance tests correlation and regression, sample size determination, study design and multivariate analysis.

Sr. No.	Topics	No. of Hrs.
1	Introduction to research methods	5
2	Identifying research problem	5
3	Ethical issues in research	5
4	Research design	5
5	Basic Concepts of Biostatistics	5
6	Types of Data	5
7	Research tools and Data collection methods	5
8	Sampling methods	5
9	Developing a research proposal	5
Total		**45 hrs**

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

SEMESTER-V

BO 5.1 Contact Lenses I

Teaching Objective	• The Course provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses. • To make students understand the basics of contact lenses • List the important properties of contact lenses • To teach about different types of CL design for various kinds of patients • To demonstrate various types of fitting • Explain all the procedures to patient • To teach how to identify and manage the adverse effects of contact lens
Learning Outcomes	• Following completion of the programme an optometrist will be able to demonstrate: • A detailed knowledge of lens design and manufacture for RGP including verification. • An ability to fit and assess a range of RGP lens designs • An ability to fit a range contact lenses to correct regular and irregular astigmatism, such as early keratoconus • An ability to fit a range of contact lenses to correct presbyopia • An ability to provide ongoing management and advice for maintaining healthy contact lens wear • An ability to detect, assess and manage the impact of contact lens complications on the anterior eye • An ability to produce a comprehensive contact lens record • An ability to communicate effectively with contact lens patients, fellow professionals and contact lens manufacturers and suppliers

Sr. No.	Topics	No. of Hrs.
1	**Introduction to Contact lenses-** Definition, Classification / Types	3
2	History of Contact Lenses	2
3	**Optics of Contact Lenses-** Magnification & Visual field, Accommodation & Convergence, Back & Front Vertex Power / Vertex distance calculation	3
4	**Review of Anatomy & Physiology of-**Tear film,Cornea,Lids& Conjunctiva	2
5	**Introduction to CL materials-** Monomers, Polymers	2
6	**Properties of CL materials-** Physiological (Dk, Ionicity, Water content),Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index)	3

7	Indications and contraindications	2
8	Parameters / Designs of Contact Lenses & Terminology	2
9	RGP Contact Lens materials	2
10	Manufacturing Rigid and Soft ContactLenses –various methods	2
11	Pre-Fitting examination –steps, significance, recording of results	2
12	Correction of Astigmatism with RGP lens	2
13	Types of fit –Steep, Flat, Optimum –on spherical cornea with spherical lenses	2
14	Types of fit –Steep, Flat, Optimum –on Toric cornea with spherical lenses	2
15	Calculation and finalizing Contact lens parameters	2
16	Ordering Rigid Contact Lenses –writing a prescription to the Laboratory	1
17	Checking and verifying Contact lenses from Laboratory	2
18	Modifications possible with Rigid lenses	2
19	**Common Handling Instructions**- Insertion & Removal Techniques, Do's and Dont's	2
20	**Care and Maintenance of Rigid lenses** - Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners	2
21	Follow up visit examination	1
22	Complications of RGP lenses	2
Total		**45 hrs**

BO 5.1P - Contact Lenses I

Sr. No.	Topics	No. of Hrs.
1	Preliminary measurements and slit Lamp	30 hrs
2	Keratometry	
3	Fitting Philosophies	
4	Handling instructions	
5	Care and maintenance	
Total		**30 hrs**

Recommended Learning
Resources Text Books:

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

Reference books or related websites: www.iacle.org

BO 5.2 Binocular Visions I & II

Teaching Objective	• This course provides theoretical aspects of Binocular Vision and its clinical application. 1. It deals with basis of normal binocular vision and space perception, • Gross anatomy and physiology of extraocular muscles • To teach various binocular vision anomalies, its diagnostic approaches and management. • To enable students, understand classification of strabismus, its etiology signs and symptoms, necessary Orthoptic investigations, diagnosis and non-surgical management.
Learning Outcomes	On successful completion of this module, a student will be expected to be able to:- • Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extra ocular muscles. • Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies. • Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely. • Ability to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. • Ability to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

Sr. No.	Topics	No. of Hrs.
1	**Binocular Vision and Space perception-** Relative Courseive 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.	6
2	**Anatomy of Extra Ocular Muscles-** Rectii and Obliques, LPS, Innervation & Blood Supply, Physiology of Ocular movements, Center of rotation, Axes of Fick, Action of individual muscle, Laws of ocular motility, Donder's and Listing's law, Sherrington's law, Hering's law, Uniocular& Binocular movements - fixation, saccadic & pursuits, Version &Vergence., Fixation & field of fixation	4
3	**Near Vision Complex Accommodation-** Definition and mechanism ,(process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation –aetiology and management.	3
4	**Convergence-** Definition and mechanism, Methods of measurement, Types and components of, convergence - Tonic, accommodative, fusional, proximal, Anomalies	4

	of Convergence –aetiology and management.	
5	Sensory adaptations Confusion	3
6	Suppression Investigations, Management Blind spot syndrome	2
7	Abnormal Retinal Correspondence, Investigation and management, Blind spot syndrome	3
8	Eccentric Fixation, Investigation and management	3
9	**Amblyopia Classification:** Aeitiology, Investigation, Management	3
10	Neuro-muscular anomalies: Classification and etiological factors	2
11	History –recording and significance.	3
11	**Convergent strabismus-** Accommodative convergent squint : Classification , Investigation and Management, Non accommodative Convergent squint : Classification , Investigation and management	3
12	Divergent Strabismus : Classification, A& V phenomenon , Investigation and ,Management	3
13	Vertical strabismus : Classification , Investigation and, Management	2
14	**Paralytic Strabismus : Acquired and Congenital-**Clinical Characteristics, Distinction from comitant and restrictive Squint	3
15	**Investigations-** History and symptoms, Head Posture, Diplopia Charting , Hess chart, PBCT, Nine directions, Binocular field of vision	5
16	Nystagmus	2
17	Surgical and Non-surgical Management of Squint	2
18	**Restrictive Strabismus –** Features- Musculo facial anomalies, Duane's Rétraction syndrome, Clinical features and management, Brown's Superior oblique sheath syndrome, Strabismus fixus, Congenital muscle fibrosis	4
Total		**60 hrs**

BO 5.2P - Binocular Vision I & II

Sr. No.	Topics	No. of Hrs.
1	Examination of status of binocular vision – W.F.D.T, Maddox rod, wing, Accommodation, vergences	30 hrs
2	Type of Cover Test, ocular movement, diplopia charting	
Total		**30 hrs**

Recommended Learning Resources: Text Books:

- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- 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
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular VisionHeterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

BO 5.3 Low Vision Aids

Teaching Objective	•To understand definition of low vision, epidemiology aspect of visual impairment, •To teach about types of low vision devices and its optical principles and magnification calculation. •To unable students, understand the clinical approach of the low vision patients •To teach students about assistive devices for totally visually challenged, •To enable students, understand art of prescribing low vision devices and training the low vision patients and other rehabilitation measures •To understand appropriate referral and follow-up
Learning Outcomes	• An understanding of the terminology used to describe low vision and visual impairment • An understanding of the epidemiology and demography of low vision in India • An understanding of the impact of low vision, including emotional impact, on an individual and their community • Ability to assess people with low vision • Ability to determine magnification requirements and to prescribe, dispense and train in the use of electronic and optical low vision task appropriate devices • Ability to prescribe appropriate functional adaptive devices Ability to establish effective communication with individuals, their family, careers and with other organizations and professionals.

Sr. No.	Topics	No. of Hrs.
1	Definitions & classification of Low vision	2
2	Epidemiology of low vision, Model of low vision service	2
3	Pre-clinical evaluation of low vision patients –prognostic & psychological factors; psycho-social impact of low vision	2
4	Clinical evaluation –assessment of visual acuity, visual field, selection of low vision aids, instruction & training	2
5	Optics of Low vision devices	2
6	Types of low vision devices –optical aids, non-optical aids & electronic devices	3
7	Pediatric Low Vision care and Special children	3
8	Low vision aids –dispensing & prescribing aspects	3
9	Management of Field loss in Low vision - Eccentric viewing Training, Prescription of Prisms	3
10	Visual rehabilitation & counseling	2

11	Legal aspects of Low vision in India	2
12	Case Analysis	4
Total		**30 hrs**

Recommended Learning Resources:

Text Books:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
2. E Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2000.
3. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
4. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
5. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

BO 5.4 Systemic Diseases

Teaching Objective	• Common Systemic conditions: Definition, diagnostic approach, complications and management options • Ocular findings of the systemic conditions • First Aid knowledge
Learning Outcomes	• To have an understanding of various systemic diseases that all affect the eyes • To have an understanding of the ocular side effects of various drugs that are used to manage or treat systemic diseases • To understand the role of an optometrists for co management of an systemic diseases with other health care professionals

Sr. No.	Topics	No. of Hrs.
1	**Hypertension-**Definition, classification, Epidemiology, clinical examination, complications, and management, Hypertensive retinopathy	2
2	**Diabetes Mellitus-**Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications: Diabetic Retinopathy	2
3	**Thyroid Disease-** Physiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors; Grave's Ophthalmopathy	2
4	**Acquired Heart Disease-** Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm, Ophthalmic considerations	2
5	**Cancer :**Incidence, Etiology, Therapy, Ophthalmologic considerations	2
6	**Connective Tissue Disease-** Rheumatic arthritis, Systemic lupus erythematosus, Scleroderma, Polymyositis and dermatomyositis, Sjogren syndrome, Behcet's syndrome, Eye and connective tissue disease	2
7	**Tuberculosis-** Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.	2
8	Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)Herpes and the eye	4
9	Hepatitis (Hepatitis A, B, C)	2
10	Acquired Immunodeficiency Syndrome	4
11	Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)	3
12	**Common Tropical Medical Ailment-** Malaria, Typhoid, Dengue, Filariases, Onchocerciasis, Cysticercosis, Leprosy	3
13	**Nutritional and Metabolicdisorders**: Obesity, Hyperlipidaemias, Kwashiorkor, Vitamin A Deficiency, Vitamin D Deficiency, Vitamin E Deficiency, Vitamin K Deficiency, Vitamin B1,B2, Deficiency, Vitamin C Deficiency,	3
14	Myasthenia Gravis	2
15	First Aid, General Medical Emergencies, Preoperative precautions in ocular surgeries	2
16	**Psychiatry**- Basic knowledge of psychiatric condition andPatient Management	2

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.	3
Total		**45 hrs**

Reference books or related websites:

Recommended Learning Resources: Text Books:

a. 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

b. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

BO 5.5 CP - Community Orientation &Clinical Visit (including related practical's to the parent course) (Total -405 hrs.)

CORE ELECTIVE COURSES

BO 5.6 Basics of Clinical Skill Learning

Teaching Objective	• To Understand the basic ideas on how to check for Vital Signs of the Patient • This course the Student will learn how to handle the patients and their positioning • They will also learn on the Basics of Nasal-Gastric Tube • The Students will learn on Administration of IV, IV and Medication • Also they will know about Cleanliness in the Asepsis
Learning Outcomes	• After successful accomplishment of the course, the students would be able to Measure Vital Signs, do basic physical Examination of the patients, NG tube basics, Administration of Medicines • The students will learn about Asepsis, and the Cleanliness related to asepsis and on mobility of the patients

Sr. No.	Topics	No. of Hrs.
1	**MEASURING VITAL SIGNS:** Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale	5
2	**PHYSICAL EXAMINATION:**Observation, Auscultation(Chest), Palpation, Percussion, History Taking	10
3	**FEEDING: ENTRAL FEEDING, NG TUBE:**Measurement, Procedure, Care, Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parentral Nutrition.	10
4	**ADMINISTRATIONS:**Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter,Venturi Mask, face mask)	10
5	**ASEPSIS:**Hand wash Techniques,(Medical, Surgical) Universal Precaution, Protecting Equipments: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire ,Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment	5
6	**MOBILITY AND SUPPORT:**Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints	5
Total		**45 hrs**

BO 5.6 Hospital Operation Management

Teaching Objective	• To promote scientific management of hospital and advancement of health care systems so as to make it rational, responsive and cost efficient • To promote the development of high quality of hospital care in the community and the country. • It has to provide a satisfactory environment to the patient and also to the doctors for clinical research.
Learning Outcomes	• Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors • Communicate effectively and develop their leadership and teambuilding abilities • Apply modern change management and innovation management concepts to optimize structures • Analyze existing hospital service policies and enhance their alignment within the local and national context

Sr. No.	Topics	No. of Hrs.
1	**MEDICO-LEGAL CASES:** Introduction, Laws associated with Medico-Legal Cases, Three Core Contents in Medico-legal cases w.r.t Doctors, Patient & Profession,	5
2	**CONSIDERATIONS OF ETHICS:** Consent, Confidentiality, Mental Health, End of life and Organ Transportation, Research & Clinical Trials	10
3	**HOSPITAL INFORMATION SYSTEM(HIS):** Hospital Information System Management, software applications in registration, billing, investigations, reporting, medical records management, Security and ethical challenges	10
4	**EQUIPMENT OPERATIONS MANAGEMENT:** Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS	10
5	**ROLE OF MEDICAL RECORDS IN HEALTH CARE MANAGEMENT:** Computers for Medical records, Developments of computerized medical record information processing system(EMR's), Computer stored (Vs) Manual hand written record, Advantages of EMR (Vs) Manual	10
Total		**45 hrs**

SEMESTER-VI

BO 6.1 Contact Lenses II

Teaching Objective	• The Course provides the student with suitable knowledge both in theoretical and practical aspects of hydrogel Contact Lenses. • To make students understand the basics of contact lenses • To list the important properties of Hydrogel contact lenses • To teach about different types of hydrogel CL design for various kinds of patients • To demonstrate various types of fitting • Explain all the procedures to patient • To teach how to identify and manage the adverse effects of contact lens
Learning Outcomes	• To have a detailed knowledge of lens design and manufacture for SCL including verification. • To be able to fit and assess a range of SCL lens designs • To be able to fit a range of contact lenses to correct presbyopia • To be able to provide ongoing management and advice for maintaining healthy cotact lens wear • To be able to detect, assess and manage the impact of SCL contact lens complications on the anterior eye. • To be able to produce a comprehensive contact lens record. • To be able to communicate effectively with contact lens patients, fellow professionals and contact lens manufacturers and suppliers

Sr. No.	Topics	No. of Hrs.
1	SCL Materials & Review of manufacturing techniques	2
2	Comparison of RGP vs. SCL	1
3	Pre-fitting considerations for SCL	2
4	Fitting philosophies for SCL	3
5	Fit Assessment in Soft Contact lenses :Types of fit –Steep, Flat, Optimum	3
6	Calculation and finalizing SCL parameters	2
7	Modalities of Soft contact lenses available and their advantages	2
8	**Soft Toric CL-** Stabilization techniques, Parameter selection, Fitting assessment,	2
9	Common Handling Instructions, Insertion & Removal Techniques, Do's and Dont's	1
10	**Care and Maintenance of Soft lenses -** Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners	2
11	Follow up visit examination	2
12	Complications of Soft lenses	3

13	**Therapeutic contact lenses-** Indications, Fitting consideration	1
14	**Specialty fitting:** Aphakia, Pediatric, Post refractive surgery	2
15	Management of Presbyopia with Contact lenses	2
Total		**30 hrs**

BO 6.1P -Contact Lenses II

Sr. No.	Topics	No. of Hrs.
1	Preliminary measurements and slit Lamp	30 hrs
2	Keratometry	
3	Fitting Philosophies	
4	Handling instructions	
5	Care and maintenance	
Total		**30 hrs**

Recommended Learning Resources:

Text Books:

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

Reference books or related websites: www.iacle.org

BO 6.2 Sports Vision

Teaching Objective	• The Course provides suitable knowledge for students to understand the visual needs of athletes for various kinds of dynamic and static sports, vision training, protective and vision correction options. • To make students understand the visual demands for various sports activities for athletes • To make students understand the various visual correction and sports vision training options available to enhance visual skills of athletes • To make students understand the various kinds of sports injuries and sports protective devices available
Learning Outcomes	• To understand visual demands for various kinds of sports for athletes • To perform a comprehensive sports vision assessment for athletes • To be able prescribe vision correction appropriate to address the visual demands for sport activity • To be able to prescribe vision training and protective devices to minimize ocular trauma due to sports.

Sr. No.	Topics	No. of Hrs.
1	Principles of Vision Training	2
2	**Introduction to Sports Vision-** History of Sports Vision, Definitions of Terms	2
3	**Vision and Sports-** Vision Performance and Athletics	2
4	Equipment List	2
5	Sports Terminologies	2
6	**Sports Vision Examinations-** Visual Acuity, High Contrast,Refraction,ColorVision,Stereopsis,Dominant Eye / Hand,EyeHealth,CoverTest,OcularMotility,Visual Field, Night Vision, Glare Sensitivity, Glare Recovery	4
7	**Visual Skills Description and Training Procedures-** Accommodation – VergenceFacility,Distance Fixation Disparity, Dynamic Visual Acuity , Eye–Hand Co-ordination, Response Speed, Eye-Foot Co-ordination, Response Speed, Eye-Foot-Body Balance, Peripheral Awareness, Anticipation Timing,Visual Concentration, Speed of Recognition, Visual Concentration, Speed of Recognition, Visual Adjustability,Peripheral Reaction Time, Visualization, Speed of Focusing, Increased Fusional Reserve, Fixation Ability, Visual Memory,Spatial Localization	4
8	Visual Skills in Sports and Prescription in the form of vision correction	3
9	Designing Sports Vision Programs	2
10	Sports-related Injuries and First Aid	3
11	Post trauma vision syndrome and Visual Midline Shift Syndrome	2
12	Special Concerns Dyslexia, Down's Syndrome	2
13	**Orthoptic Evaluation-** Identification of sports eye wear for various sports Identification of sports protective devices, Dispensing of various kinds of sports eyewear.	
Total		**30 hrs**

Recommended Learning Resources: Text Books:

Sports Vision by DFC Loran and C J MacEwen Publishers: Butterworth and Heinmann
Reference books or related websites:
Sports Vision by Graham Erickson Publishers: Butterworth and Heinmann

BO 6.3 Pediatric and Geriatric Optometry

Teaching Objective	• To practice skills in pediatric and geriatric optometric assessments and develop effective clinical management • To develop clinical competence in analysis, evaluation and management of pediatric and geriatric population. • To meet the challenge of pediatric and geriatric eye care and vision rehabilitation through clinical placement
Learning Outcomes	• To have a knowledge of the principal theories of childhood development, and visual development • To have the ability to take a thorough geriatric history, and pediatric history which encompasses the relevant developmental, visual, medical and educational issues • To be able to identify visual and ocular problems in children and the elderly by collecting relevant clinical information • To be able to perform appropriate assessment and management of accommodative-vergence system, types of ametropia, accommodation and vergence disorders. • To be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus • Manage visual / ocular disability with appropriate optical treatments, low vision aids and referral • Communicate effectively with the pediatric and geriatric patients and their attendees. • Communicate professionally with other health care professionals in terms of accurate presentation of patients' symptoms, critical analysis of clinical findings and suitable plan of action • Recognize the professional responsibility and need of life-long learning in geriatric and pediatric eye care.

Sr. No.	Topics	No. of Hrs.
1	Structural , and morphological changes of eye in elderly	1
2	Physiological changes in eye in the course of aging.	1
3	Introduction to geriatric medicine –epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)	1
4	Optometric Examination of the Older Adult	1
5	Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye	1
6	Contact lenses in elderly	1
7	Pharmacological aspects of aging	1
8	Low vision causes, management and rehabilitation in geriatrics.	1
9	Spectacle dispensing in elderly –Considerations of spectacle lenses and frames	1

10	The Development of Eye and Vision	1
11	History taking Pediatric Courses	1
12	Assessment of visual acuity	2
13	**Normal appearance, pathology and structural anomalies of-** a) Orbit, Eye lids, Lacrimal system,b) Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil, c) Lens, vitreous, Fundus Oculomotor system	2
14	Refractive Examination	2
15	Determining binocular status	1
16	Determining sensory motor adaptability	1
17	Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia	2
18	Remedial and Compensatory treatment of Strabismus and Nystagmus	1
19	Pediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics	2
20	Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism	2
21	Spectacle dispensing for children	1
22	Pediatric contact lenses	1
23	Low vision assessment in children	1
24	The Development of Eye and Vision	1
Total		**30 hrs**

BO 6.3P -Pediatric and Geriatric Optometry

Sr. No.	Topics	No. of Hrs.
1	Comprehensive Pediatric Case Work up	**30 hrs**
2	Comprehensive geriatric Case work up	
3	Diagnostic techniques for pediatric cases	
4	Dispensing of eyewear for various age groups of 0-16 years	
5	Dispensing of eyewear for geriatric population	
Total		**30 hrs**

Text Books:

- Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
- William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004
- Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V.Mosby Co. St. Louis, 1980.
- Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993
- A.J.ROSSENBLOOMJr&M.W.MORGAN:VisionandAging,Butter worth- Heinemann,Missouri,2007.
- OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi,2005
- VS Natarajan: An update on Geriatrics, SakthiPathipagam, Chennai, 1998
- DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

BO 6.4 Occupational Optometry

Teaching Objective	• To enable students, understand general aspects of occupational health. •To teach visual demand in various job, task analyzing method, visual standards for various jobs, • To enable them understand various occupational hazards and remedial aspects through classroom sessions and field visit to the factories.
Learning Outcomes	• To be able to apply different types of protocols for doing a right clinical history according to the patient profile and its context (workplace, free activities, etc). • To be able to know the functional limits of human vision and its relationship with age, as well as at occupational contexts and free activities, linking with the task visibility factors. • To acquire ability for examining, give diagnosis, and manage visual anomalies, with special relevance in the differential diagnosis related with occupational and free activity contexts. • To be able to evaluate eye hazards in occupational or free-time activities under radiant energy exposures, as well as continuous light sources such as laser, and understand their controls for avoiding eye injuries. • To be able to identify and analyze environmental and occupational hazards causing eye injuries (mechanic, chemical, electric, etc). • To acquire ability for evaluating the visual performance of any patient and propose appropriate optical prescription, environment design, visual therapy, etc • To be able to communicate and inform to patient about all tests and instructions to be applied on him/her clearly explaining the final results and their diagnosis. • To know and locate the international and national standards related to visual and eye health in each context.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etcActs and Rules - Factories Act, WCA,ESI Act	4
2	Electromagnetic Radiation and its effects on Eye	3
3	Light –Definitions and units, Sources, advantages and disadvantages, standards	3
4	Color –Definition, Color theory, Color coding, Color defects, Color Vision tests	2
5	Occupational hazards and preventive/protective methods	3
6	Task Analysis	3
7	Industrial Vision Screening –Modified clinical method and Industrial Vision test	3
8	Vision Standards –Railways, Roadways, Airlines	3
9	Visual Display Units	3
10	Contact lens and work	3
Total		**30 hrs**

Recommended Learning Resources:
Text Books:

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

BO 6.5 CP - Community Orientation &Clinical Visit (including related practical's to the parent course) (Total -540 hrs.)

INTERNSHIP

Guidelines:

1. The internship shall commence after the student has completed and passed all Courses up to VI semesters.
2. The internship is compulsory.
3. The duration of the internship shall be 6 Months.
4. The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

Evaluation of Internees:

Formative Evaluation:

Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned. The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide a demonstrable evidence of the processes
of training but more importantly of the internee's own acquisition of competence as related to performance.

Summative Evaluation:

It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns. Based on these two evaluations, the Head of the Department shall issue certificate of satisfactory completion of training, following which theuniversity shall award the degree or declare him/her eligible for it.

To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.

REGISTRAR
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