GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
(Deemed to be University)
VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^+ Grade

REGULATIONS AND SYLLABUS

OF

Bachelor of Science

in

B. Optometry
(w.e.f. 2021-22 admitted batch)

B. Optometry
REGULATIONS
(w.e.f. 2021-22 admitted batch)

1. ADMISSION

1.1 Admission into B. Optometry program of GITAM Deemed to be University is governed by GITAM deemed to be University admission regulations.

2. ELIGIBILITY CRITERIA

2.1 A first class in 10+2 or equivalent examination approved by GITAM deemed to be University with Physics, Chemistry and Biology.

2.2 Admission into B. Optometry will be based on an All-India Entrance Test (GAT) conducted by GITAM deemed to be University and the rule of reservation, wherever applicable, will be followed.

3. STRUCTURE OF THE PROGRAM

3.1 The Program consists of

i) Theory classes related to Optometry.

ii) Lab classes related to Optometry.

iii) Seminar to give exposure for presentation (and literature search)

iv) One semester internship for practical experience.

v) One semester project work

3.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

3.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.

- One credit for each Lecture/Tutorial hour per week.
- One credit for two hours of Practicals per week.
- Two credits for three (or more) hours of Practical per week.

4. The curriculum of the eight semester B. Optometry is designed to have a total of 170 credits for the award of B. Optometry degree.

5. MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6. REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the Institute/University.

7. ATTENDANCE REQUIREMENTS

7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his/her juniors.

7.2 However, the Vice-Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance of the students whose attendance is between 65% and 75% on genuine grounds and on payment of prescribed fee.

8. EVALUATION

8.1 The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical/ Project Work/ clinical Training/ Viva voce/ Seminar etc. course is completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S.No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	Theory	40	Continuous Evaluation	i) Thirty (30) marks for mid semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration. ii) Ten (10) marks for Quizzes, Assignments and Presentations.
		60	Semester-end Examination	Sixty (60) marks for semester-end examinations.
	Total	100		
2	Practicals	100	Continuous Evaluation	i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the semester. ii) Ten (10) marks for case studies. iii)Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the semester) conducted by the concerned lab Teacher.
3	Internship Training (VII) Semester)	100	Continuous Evaluation	i) Thirty (30) marks for Project performance, assessed by the Supervisor of the host Industry Organization. Submission of Project Completion Certificate from host organization is mandatory.

				ii) Forty (40) marks for Report and Seminar presentation on the training,
				assessed by the Teacher Coordinator. iii)Thirty (30) marks for presentation on the training, before a panel of examiners.
4	Project work (VIII Semesters)	100	Continuous Evaluation	i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor. ii) Thirty (30) marks for mid-term evaluation for defending the Project before a panel of examiners. iii)Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners.
	Comprehensive	100	Continuous	Through five periodic Viva-voce
5	Viva-voce (VIII Semester)		Evaluation	exams for 20 marks each, conducted by a panel of examiners. The course content for Viva exams shall be announced at the beginning of the semester.

9. RETOTALING, REVALUATION & REAPPEARANCE

9.1 Retotaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

9.2 Revaluation of the theory answer scripts of the semester-end examination is also permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

9.3.1 A student who has secured 'F' grade in a theory course shall have to reappear at the subsequent semester-end examination held in that course.

9.3.2 A student who has secured 'F' grade in a practical course shall have to attend Special Instruction classes held during summer.

9.3.3 A student who has secured 'F' Grade in project work / Industrial Training / Seminar / Comprehensive Viva-Voce etc. shall have to reappear at the time of the Special Examination to be conducted in the summer vacation.

10. SPECIAL EXAMINATION

10.1 A student who has completed his/her period of study and still has "F" grade in a maximum of five theory courses is eligible to appear for Special Examination normally held during summer vacation.

11. BETTERMENT OF GRADES

11.1 A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.

11.2 Betterment of Grades is permitted 'only once', immediately after completion of the program of study.

12. GRADING SYSTEM

12.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades and Grade Points

S.No.	Grade	Grade Points	Absolute Marks
1	O (Outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

12.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, subject to securing a GPA of 5 for a pass in the semester.

13. GRADE POINT AVERAGE

13.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$GPA = \frac{\Sigma[\ C\_\ G\ ]}{\Sigma\ C}$$

Where C = number of credits for the course.
G = grade points obtained by the student in the course.

13.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

13.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

Class	CGPA Required
First Class with Distinction	$\geq$ 8.0*
First Class	$\geq$ 6.5
Second Class	$\geq$ 5.5
Pass Class	$\geq$ 5.0

* In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.

14. ELIGIBILITY FOR AWARD OF THE B. Optometry DEGREE

1. Duration of the program: A student is ordinarily expected to complete the B. Optometry program is eight semesters of four years. However, a student may complete the program in not more than six years including study period.

2. However, the above regulation may be relaxed by the Vice-Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the B. Optometry Degree ihe/she fulfills all the following conditions:

Registered and successfully completed all the courses and projects.

Successfully acquired the minimum required credits as specified in the curriculum in the branch of his/her study within the stipulated time.

Has no dues to the Institute, hostels, Libraries, NCC/NSS etc, and

No disciplinary action is pending against him/her.

15. DISCRETIONARY POWER

Not with standing anything contained in the above sections, the Vice-Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

PROGRAM EDUCATIONAL OBJECTIVES(PEOs)

1. To develop high quality self-sustaining eye care services in neglected areas of India and other parts of the developing world.
2. To train all cadres of eye care personnel for the provision of and efficient eye care services.
3. To participate in planning eye health initiatives in the developing world.
4. To undertake research projects to understand the best way to deliver eye care services to communities.

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)

After completion of the program students able to

1. understand skills to provide comprehensive eye examination
2. acquire knowledge on carrier options of optometry
3. realize ethics in medical and optometric practice
4. explore different carrier opportunities in optometry
5. understand global leaders in area of optometry
6. explain different clinical practices
7. know the eye care precautions
8. understand best practices in evidence-based eye care
9. know ethical values in optometric practice
10. browse the digital resources available to understand ethics to be followed
11. Dissection of bovine/rabbit/human eyeballs
12. Measurement of corneal edema
13. Measurement of tear secretion
14. Measurement of TBUT
15. know the application and procedure of the optometry clinical technique/s and/or instrument/s
16. explain and demonstrate the procedure of the optometry clinical technique/s and/or instrument/s
17. perform the procedure of optometry clinical technique/s and/or instrument/s under supervision

18. analyze the findings and produce the documentation of the optometry clinical technique/s and/or instrument/s
19. compare normal and abnormal findings and generate the interpretation of the optometry clinical technique/s and/or instrument/s

Course Structures

Semester I

S.No.	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO1001	Introduction to Optometry	1	0	0	1	LVPEI
2	OPTO1011	Mathematical Concepts	3	0	0	3	GITAM
3	OPTO1021	Essential general Biology	3	0	0	3	GITAM
4	OPTO1031	Geometrical Optics I	3	0	0	3	GITAM
5	OPTO1041	General Biology Lab	0	0	2	1	GITAM
6	OPTO1051	Clinical examination techniques I Lab	0	0	10	5	LVPEI
7	OPTO1061	Essential optics I Lab	0	0	3	2	GITAM
		Total				**18**	

Semester II

S.No.	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO1071	Ocular biology (Anterior segment) I	4	0	0	4	LVPEI
2	OPTO1081	Geometrical optics II	3	0	0	3	GITAM
3	OPTO1091	Information Systems and Technology	3	0	0	3	GITAM
4	OPTO1101	Functional English and Communication	3	0	0	3	GITAM
5	OPTO1111	Geometrical Optics II Lab	0	0	3	2	LVPEI
6	OPTO1121	Optics II Lab	0	0	4	2	GITAM
7	OPTO1131	Clinical Examination Techniques II Lab	0	0	10	5	LVPEI
		Total				**22**	

Semester III

S.No.	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO2001	Ocular biology (Posterior segment) II	4	0	0	4	LVPEI
2	OPTO2011	Optics of the eye I	3	0	0	3	LVPEI
3	OPTO2021	Ocular Disease (Anterior Segment)-1	2	0	0	2	LVPEI
4	OPTO2031	General Pharmacology	2	0	0	2	GITAM
5	OPTO2041	Principles of Instrumentation	2	0	0	2	GITAM
6	OPTO2051	Ocular Biology (Posterior segment) II Lab	0	0	2	1	GITAM
7	OPTO2061	Clinical Examination Techniques III Lab	0	0	10	5	LVPEI
8	OPTO2071	Clinics I	0	0	6	2	LVPEI
		Total				**21**	

Semester IV

S.No	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO2081	Ocular diseases (Posterior segment) I	2	0	0	2	LVPEI
2	OPTO2091	Microbiology and Pathology	2	0	0	2	GITAM
3	OPTO2101	Ocular Pharmacology	2	0	0	2	GITAM
4	OPTO2111	Ophthalmic Dispensing I	2	0	0	2	LVPEI
5	OPTO2121	Optics of the Eye II	3	0	0	3	LVPEI
6	OPTO2131	Ophthalmic Instrumentation I	2	0	0	2	LVPEI
7	OPTO2141	Microbiology and Pathology Lab	0	0	2	1	GITAM
8	OPTO2151	Ophthalmic Dispensing I Lab	0	0	2	1	LVPEI
9	OPTO2161	Clinics II			12	4	
		Total				**19**	

Semester V

S.No.	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO3001	Innovation and Technology I	2	0	0	2	GITAM
2	OPTO3011	Research Methodology and Biostatistics	2	0	0	2	GITAM
3	OPTO3021	Monocular Sensory Perception	3	0	0	3	LVPEI
4	OPTO3031	Ophthalmic Dispensing II	2	0	0	2	LVPEI
5	OPTO3041	Binocular Vision I	2	0	0	2	LVPEI
6	OPTO3051	Contact Lens I	2	0	0	2	LVPEI
7	OPTO3061	Ophthalmic Dispensing II Lab	0	0	2	1	LVPEI
8	OPTO3071	Binocular Vision I Lab	0	0	2	1	LVPEI
9	OPTO3081	Contact Lens I Lab	0	0	2	1	LVPEI
10	OPTO3091	Clinics III			12	4	LVPEI
		Total				**20**	

Semester VI

S.No.	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO3101	Visual Development and Aging	2	0	0	2	LVPEI
2	OPTO3111	Systemic Diseases and Nutrition	2	0	0	2	GITAM
3	OPTO3121	Practice Management	2	0	0	2	GITAM
4	OPTO3131	Public Eye Health and Epidemiology	3	0	0	3	LVPEI
5	OPTO3141	Low vision and Rehabilitation	3	0	0	3	LVPEI
6	OPTO3151	Binocular Vision II	2	0	0	2	LVPEI
7	OPTO3161	Contact Lens II	2	0	0	2	LVPEI
8	OPTO3171	Innovation and Technology II	2	0	0	2	GITAM
9	OPTO3181	Contact Lens II Lab	0	0	2	1	LVPEI
10	OPTO3191	Clinics IV Lab	0	0	12	4	LVPEI
		Total				**23**	

Semester VII

S. No	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO4001	Internship I	0	0	32	14	LVPEI
2	OPTO4011	Research Project I	0	0	8	4	LVPEI
3	OPTO4021	Case Discussion I	0	0	4	2	LVPEI
		Total			**44**	**22**	

Semester VIII

S. No	Course Code	Course Title	L	T	P	C	Remarks
1	OPTO4031	Internship II	0	0	32	14	LVPEI
2	OPTO4041	Research Project II	0	0	8	4	LVPEI
3	OPTO4051	Case Discussion II	0	0	4	2	LVPEI
		Total			**44**	**22**	

Details of Total no of Credits per Semester:

Semester	I	II	III	IV	V	VI	VII	VIII	**Total**
Credits	18	22	21	19	20	21	22	22	**165**

OPTO1001: Introduction to Optometry

L	T	P	C
3	0	0	3

Preamble: This course is to introduce the basic introduction to optometry. In this course, use of optometry on eye care will be taught. The knowledge from this curse will be utilized to know the best practices available in medical and optometric practices in India.

Course Objectives:

- To understand skills to provide comprehensive eye examination
- To acquire knowledge on carrier options of optometry
- To realize ethics in medical and optometric practice

Syllabus

UNIT I **8 Hours**

The eye health scenario globally and in India, different career options in optometry Interaction with leaders in Indian and global optometry.
Learning Outcomes:
By the end of this Unit, the student will be able to

- explore different carrier opportunities in optometry
- understand global leaders in area of optometry

UNIT II **8 Hours**

What is optometry and how do optometrists contribute to eye care, Different clinical practice streams of optometry
By the end of this Unit, the student will be able to

- explain different clinical practices
- know the eye care precautions

UNIT III **8 Hours**

Introduction to evidence-based practice in medicine, integrating evidence-based practice into studying optometry

By the end of this Unit, the student will be able to

- understand best practices in evidence-based eye care

UNIT IV **8 Hours**

Digital resources for evidence-based practice: The Cochrane database, BMJ Best Practice, Ethics in medical/optometric practice.

By the end of this Unit, the student will be able to

- know ethical values in optometric practice

- browse the digital resources available to understand ethics to be followed

UNIT V **8 Hours**

Optometry in practice at the L V Prasad Eye Institute, Optometry legislation - council and professional organizations

By the end of this Unit, the student will be able to

- role of L V Prasad Eye institute on the public eye health of national and international scenario.

Course Outcomes:

By the end of this course, the student will be able to

- explore different carrier opportunities in optometry
- understand global leaders in area of optometry
- explain different clinical practices
- know the eye care precautions
- understand best practices in evidence-based eye care

References:

Text Book:

Blepharitis: A Comprehensive Clinical Guide (Farooq & Reidy, 2021) EBSCO host

OPTO1011: Mathematical Concepts

L	T	P	C
3	0	0	3

Preamble: This course is to introduce the basic calculus and geometry of lines and conics in the Euclidean plane. Students can develop geometry with a degree of confidence and will gain fluency in the basics of calculus and Euclidean geometry. In this course, foundational essential Mathematics for Optometry will be taught. The knowledge from this math will be utilized to identify sight lines and vision angles during an eye exam.

Course Objectives:

- Explain the concept of limit and derivative.
- Elaborate how to find the tangent and normal of curve using calculus.
- Introduce the concept of Integration.
- Describe parametrize curves.
- Explicate to evaluate the distance and angle.
- Elucidate to sketch and identify conic sections.

Syllabus

UNIT-I **10 Hours**

Differential Calculus: Limits, continuity, and differentiability of real valued functions of a real variable, Derivative as a rate of change, velocity, acceleration, related rates

Learning Outcomes:
By the end of this Unit, the student will be able to

- explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
- compare the ideas of continuity and differentiability.
- to use differentiability concept to find derivatives of composite functions.

Unit-II **8 Hours**

Integral Calculus: Integration, applications of derivatives and integrals, derivative as a measure of slope, tangent, normal and angle between curves.

Learning Outcomes:
By the end of this Unit, the student will be able to

- Develop the concepts of definite and indefinite integrals
- Learn methods of integration
- Learn some applications of integral calculus

Unit-III **10 Hours**

Points and line, vector structure, parameterized lines, pencils of lines. Euclidean plane, scalar product, length and distance, angle

Learning Outcomes:
By the end of this Unit, the student will be able to

- Develop the concepts basic coordinate system and point
- Find the coordinate of the mid of line and length of line
- Understand the relationship between parallel and perpendicular lines
- Learn to derive the equation of straight line and also the angle between the lines

Unit-IV **10 Hours**

Circle: Circles and generalized conics, General conics and centers of general conics, Degenerate conics and axes, asymptotes, Axes, asymptotes, focus and directrix. Tangents and normal

Learning Outcomes:
By the end of this Unit, the student will be able to

- Develop the concepts of circle and general conics
- Study the equation of circle and find the center and radius of circle
- Learn to find the tangent and normal of the circle

Unit-V **8 Hours**

Conic section: Parabola, Ellipse, Hyperbola, Pole and polar, orthoptic loci, Classifying and distinguishing conics

Learning Outcomes:
By the end of this Unit, the student will be able to

- Learn Standard position for each of the conic section
- Lean the concept the Focus, directrix, and axis of symmetry of a parabola
- Learn the foci, major and minor axes, center, and vertices of an ellipse
- Learn foci, branches, vertices, transverse and conjugate axes, and asymptotes of a hyperbola
- Able to recognize the conic sections from their functions in standard from and from their graphs.

Course Outcomes:

Upon completion of the courses, the student can

- apply the basic concept of differential and integral calculus and solve the problem to find the derivate or integrate a given function as application of real problem associate in optometry analysis.
- solve the problem dealing with coordinate geometry: straight line and conic sections
- identify sight lines and vision angles during an eye exam

Prescribed books

1. Rao, Murthy, Sarma, Sastry, Ranganatham: Differential Calculus (Theory & Practical), S. Chand
2. C.G.Gibson: Elementary Euclidean Geometry: An Introduction, Cambridge University Press.
3. H.İ.Karakaş, Analytic Geometry, METU Publishers.

Reference books

1. R.A.Adams and C.Essex, Calculus: A Complete Course, 7/e, Pearson.

OPTO1021: Essential General Biology

L	T	P	C
3	0	0	3

Preamble:
Proper knowledge about the human body is essential in order to understand the different aspects of organization of the body and the correlation between the different organs and systems for a healthy and balanced life.

Course Objectives:

- To impart fundamental knowledge on the cellular level of organization of the human body.
- To explain the gross structure and functions of the various systems of the human body.

UNIT –I **10 Hours**

Introduction to human body
Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

Cellular level of organization
Structure and functions of cell, transport across cell membrane, cell division, cell organelles.

Tissue level of organization
Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Learning Outcomes:
By the end of this unit, the student will be able to

- Understand the structural aspects of the human body.
- Understand the cellular and tissue level of organization.
- Know about the basic life processes and maintenance of homeostasis.

UNIT– II **10 Hours**

Skeletal system: Divisions of skeletal system. Types of bones. Salient features and functions of bones of
axial and appendicular skeletal systems.
Organization of skeletal muscle, physiology of muscle contraction, neuro muscular Junction.
Joints Structure and functional classification, types of joints movements and articulation.

Learning Outcomes:
By the end of this unit, the student will be able to

- By the end of this unit, the student will be able to
- Understand the basic framework of the human body.
- Know about the different bones of the body.
- Understand the muscular coordination of body movements.

UNIT– III **8 Hours**

Body fluids
Body fluids, composition, and functions of blood, haemopoiesis, formation of hemoglobin, mechanisms of coagulation, blood grouping, Rh factor, blood transfusion and its significance. Reticulo – endothelial system. Blood disorders.
Digestion and Absorption
Human alimentary can a land digestive gland. Role of digestive enzymes. Digestion, absorption and assimilation of digested food.

Learning Outcomes:
By the end of this unit, the student will be able to

- Know about blood and understand its structural and functional aspects.
- Understand the concepts of blood groups and blood transfusion.
- Understand the mechanism of digestion and absorption of food thereby leading to various life processes in the human body.

UNIT– IV **8 Hours**

Integumentary system Structure and functions of human skin Special senses Structure and functions of eye, ear, nose and tongue and their disorders.
Breathing and respiration Human respiratory system
Mechanism of breathing and its regulation
Exchange of gases, transport of gases and regulation of respiration Respiratory volumes

Learning Outcomes:

- By the end of this unit, the student will be able to
- Understand the structural and functional aspects of the sense organs.
- Understand the breathing mechanism and terminologies used thereof.

UNIT– V **10 Hours**
Endocrine System: Endocrine glands and their secretions, Functions of hormones secreted by endocrine glands
Neural control and coordination
Definition and classification of nervous system. Structure of a neuron
Generation and conduction of nerve impulse. Structure of brain and spinal cord.
Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

Learning Outcomes:
By the end of this unit, the student will be able to

- Understand the hormonal level of control of the human body and various life processes.
- Know about the secretary glands of the human body.
- Understand the human nervous system.
- Understand the structural and functional aspects of the human brain and spinal cord.

Course Outcomes:
By the end of this course, the student will be able to

- Understand the basic framework of the human body.
- Know about the different bones of the body.
- Understand the muscular coordination of body movements.

- Know about blood and understand its structural and functional aspects.
- Understand the concepts of blood groups and blood transfusion.
- Understand the mechanism of digestion and absorption of food thereby leading to various life processes in the human body.
- Understand the hormonal level of control of the human body and various life processes.
- Know about the secretary glands of the human body.
- Understand the human nervous system.
- Understand the structural and functional aspects of the human brain and spinal cord.

Prescribed books

1. K. Sembulingam and P. Sembulingam. Essentials of Medical Physiology by Jaypee brothers medical publishers, New Delhi.
2. Kathleen J.W. Wilson, Churchill Livingstone, Anatomy and Physiology in Health and Illness by New York
3. Tortora Grabowski, Palmetto, Principles of Anatomy and Physiology by GA, U.S.A.
4. Inderbir Singh, Textbook of Human Histology, Jaypee brother's medical publishers, New Delhi.
5. C.L. Ghai, Textbook of Practical Physiology, Jaypee brother's medical publishers, New Delhi.
6. K. Srinageswari and Rajeev Sharma, Practical workbook of Human Physiology, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Williams &Wilkins Co, Physiological basis of Medical Practice, Best and Tailor Riverview,USA.
2. Arthur C, Guyton and John. E. Hall. Text book of Medical Physiology- Miamisburg, OH, U.S.A.
3. Dr. C.C. Chatterrje, Human Physiology (vol 1 and 2), Academic Publishers Kolkata.

OPTO1031: Geometrical Optics I

L	T	P	C
3	0	0	3

Preamble:
This course deals with the basic nature of light and its interactions with medium. The interactions of light can be understood through the wave nature of the light. The interaction of light with itself and medium is crucial for having right insight on functioning of eye and physics behind formation of images and processing of optical information.

Course Objectives:
- To introduce the basic concept of light and basic nature of light
- To analyses the behaviour of light in medium.

UNIT I **I8 Hours**

Nature of light–light as electromagnetic oscillation–wave equation; ideas of Sinusoidal oscillations–simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase. Sources of light; Electromagnetic Spectrum. Polarized light; linearly polarized light and circularly polarized light. Intensity of polarized light; Malus' Law; polarizer and analyzers; Methods of producing polarized light; Brewster's angle. Birefringence; ordinary and extraordinary rays.

Learning Outcomes:
At the end of the Topic the student will be able to
- describe the concept of light
- explain the electromagnetic spectrum based on wavelength
- determine the polarization of light when reflected from a surface
- compare the oscillations of electric field in the light

UNIT II **8 Hours**

Coherence; interference; constructive interference, destructive interference; Fringes; fringe width, relationship between amplitude and intensity 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.

Learning Outcomes:
At the end of the topic the student will be able to
- interpret the coherence and interference of light
- calculate the amplitude and intensity of the light waves which undergo interference
- recognize the diffraction phenomenon
- calculate the resolution of an optical instrument
- describe the scattering of light

UNIT III **10 hours**

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 vengeance; rays; convergence and divergence in terms of rays and vengeance; vengeance at a distance Refractive index; its

dependence on wavelength, Fermat's and Huygens Principle – Derivation of laws of reflection and refraction (Snell's law) from these principles.

Learning Outcomes:

At the end of the Topic the student will be able to

- recognize the wave nature of light
- calculate the speed of the light in various medium
- outline the concept of wavefronts from Huygens principle
- derive the laws of reflection and refraction

UNIT IV **10 hours**

Plane mirrors – height of the mirror; rotation of the mirror Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vengeance equation, Imaging by concave mirror, Imaging by convex mirror**,** Reflectivity; transitivity, 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. Thin prism – definition; definition of Prism dioptre. Deviation produced by a thin prism; it dependence on refractive index.

Learning Outcomes:

At the end of the topic the student will be able to

- identify the effect on the light due to plane mirror
- predict the image formed by concave and convex mirrors
- describe the reflectivity and transitivity
- analyse refraction of light due to prism
- define flint glasses, prism diopter

UNIT V **7 hours**

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 vengeance equation. Imaging by a positive powered surface. Imaging by a negative powered surface. Vengeance at a distance formula. Effectivity of a refracting surface.

Learning Outcomes:

At the end of the topic the student will be able to

- describe the refraction of light by a spherical surface
- identify spherical aberration
- derive vengeance equation
- compute image formed by positive and negative powered surface

Course Outcomes:

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

- describe the concept of light
- explain the electromagnetic spectrum based on wavelength
- calculate the resolution of an optical instrument
- describe the scattering of light
- outline the concept of wavefronts from Huygens principle

- identify spherical aberration
- derive vengeance equation
- compute image formed by positive and negative powered surface

Textbooks:

1. Subrahmanyan.N, BrijLal, A textbook of Optics, S.Chand.Co Ltd, New Delhi, India,2003.
2. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
3. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

Reference Books:

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

OPTO1041: General Biology Lab

L	T	P	C
0	0	2	1

List of experiments:

1. Study of compound microscope.
2. Study of cell and cell organelles.
3. Microscopic study of epithelial, connective tissue, muscular and nervous tissues.
4. Identification of axial bones
5. Identification of appendicular bones
6. Study of human eye
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of heart rate and pulse rate.
14. Recording of blood pressure.

Course Outcomes:
Upon completion of this course the student should be able to

- explain the gross morphology, structure and functions of various organs of the
- human body.
- understand the cellular level of organization of the human body.
- identify the various tissues and organs of different systems of human body.
- understand the coordinated working pattern of different organs of each system.
- perform the various experiments related to special senses and nervous system.

OPTO1051: Clinical examination techniques I Lab

L	T	P	C
3	0	0	3

Course Description:
Course Aim to impart fundamental application and appropriate procedure to perform optometry clinical technique/s conducted during a comprehensive ocular examination. This course is also intended to facilitate extensive skill-oriented hands-on practice and a base of knowledge on documentation and interpretation of the optometry clinical technique/s.

This course is a fundamental course on which to base the subsequent optometric clinical training which happens in the second year and during patient-care observation.

Course Objectives:
- To perform the optometry clinical techniques
- to facilitate extensive skill-oriented hands-on practice
- to facilitate a base of knowledge on documentation and interpretation of the optometry clinical technique/s

Syllabus:
Clinical etiquette
- Communication with the patient and professional behavior
- Preparation of the examination room and hygiene
- Professional conduct, confidentiality of patient records and adherence to safety policies
- Flow chart of sequence of comprehensive eye examination & logical steps in performing the procedures

Eliciting clinical history
- Components of eliciting clinical history for an ophthalmic patient and standard documentation
- Eliciting and documentation of detailed clinical history in the following patient profiles (known/suspected): a) Refractive errors b) Cataract c) Diabetes & Hypertension d) eyelid disorders e) Conjunctivitis
- Understanding wellbeing of the patient and recognizing challenges in patient's gait, verbal response & systemic illness

Visual acuity measurement

a) Visual acuity measurement for far distance
- Standard procedures of visual acuity measurement for far distance, designation of visual acuity, interpretation of the findings and documentation
- Visual acuity measurement for far distance in an adult patient with only ocular disability by using snellen visual acuity chart
- Visual acuity measurement for far distance in an adult patient with only ocular disability by using LogMAR visual acuity chart
- Alternate methods of visual acuity assessment for far distance
- Testing distance conversions & assigning visual acuity scores

b) Visual acuity measurement for near distance

- Standard procedures of visual acuity measurement for near distance, designation of visual acuity, interpretation of the findings and documentation
- Visual acuity measurement for near distance in an adult patient with only ocular disability by using LogMAR word reading near visual acuity chart
- Alternate methods of visual acuity assessment for near distance
- Testing distance conversions & assigning visual acuity scores

Manual Lensometry

- Instrumentation and labeling the parts of the manual lensometer instrument, its operating principles and optics of the manual lensomete rinstrument
- Measurement of the refractive power of the single vision spectacles using manual lensometer
- Measurement of the refractive power of the bifocal spectacles using manual lensometer

Objective retinoscopy

- Instrumentation and labeling the parts of the retinoscope instrument, its operating principles and optics of the retinoscope instrument
- Movement of the retinal reflex, characteristics of the reflex and working distance correction
- Static dry retinoscopy on an eye with clear media for any given spherical ametropia and its documentation
- Recognizing presence of astigmatism, break & skew phenomenon, thickness phenomenon and straddling the axis
- Static dry retinoscopy on an eye with clear media for any given regular astigmatic patients and its documentation
- Sources of error during retinoscopy

Subjective retinoscopy

- Standard procedures of subjective refining techniques in indicated cases to confirm the endpoint of refraction/refractive error
- Determining theendpoint of refraction/refractive error using Maximum plus Maximum Visual Acuity (MPMVA) technique
- Determining the endpoint of refraction/refractive error using Duochrome technique
- Standard procedures used for correction for near vision
- Measurement of inter pupillary distance of the eye balls using PD ruler and pen torch
- To write a suitable spectacle prescription

Anterior segment examination

a) Slit lamp biomicroscopy

- Instrumentation and labeling the parts of the slit lamp biomicroscopeinstrument, its operating principles and optics of the slit lamp biomicroscope instrument
- Examination of the anterior segment ocular structures using slit lamp biomicroscope by diffuse and direct focal illumination techniques

- Examination of the anterior segment ocular structures using slit lamp biomicroscope by in-direct illumination techniques
- Examination of the anterior segment ocular structures using slit lamp biomicroscope by Retro- illumination technique
- Anterior chamber angle evaluation by Van Herrick's technique and grades used for angle estimation

b) Assessment of pupils

- Identification of reaction of the pupils (direct and consensual), comment on its shape, size and speed of reaction
- Relative afferent pupillary defect (RAPD) assessment

c) Measurement of Intraocular Pressure (IOP)

- Instrumentation and labeling the parts of the Goldmann applanation tonometerinstrument, its operating principles and optics of the Goldmann applanation tonometer instrument
- Measurement of intraocular pressure of the eyeball using slit lamp biomicroscope and Goldmann Applanation tonometer
- Sources of error during intraocular pressure measurement

Posterior segment examination

- Instrumentation and labeling the parts of the direct ophthalmoscope instrument, its operating principles and knowledge on optics of the direct ophthalmoscope instrument.

- Examination of the posterior segment ocular structures using direct ophthalmoscope by different examination techniques

Course Outcomes:

- apply the optometry clinical technique/s and/or instrument/s
- demonstrate the procedure of the optometry clinical technique/s and/or instrument/s
- perform the procedure of optometry clinical technique/s and/or instrument/s under supervision
- analyze the findings and produce the documentation of the optometry clinical technique/s and/or instrument/s
- compare normal and abnormal findings and generate the interpretation of the optometry clinical technique/s and/or instrument/s

References:

1. Kuraikore, Clinical Insight and Examination Techniques in Ophthalmology (Hb 2020), Springer

OPTO1061: Essential optics I Lab

L	T	P	C
0	0	4	2

List of Experiments

1. Refractive index of prism for sodium D-Line using spectrometer
2. Dispersive power of prism for Hg source using spectrometer
3. Air wedge - Interference method to find diameter of an optically thin wire
4. Newton's ring - to find the wavelength of sodium light
5. Biprism - To find the wavelength of sodium light
6. Diffraction grating - (Minimum deviation method). of Hg prominent lines
7. Polarimeter - specific rotation of dextrose and concentration of IV injection
8. Lumenbrodem Photometer - Comparison of luminous power
9. μ of liquid - using liquid prism - spectrometer
10. Michelson interferometer -wavelength of laser light.

SEMESTER II

OPTO1071 Ocular biology (Anterior segment) I

L	T	P	C
3	0	0	3

Course Description

The basic anatomy and physiology of different parts of the eye and adnexa will be discussed in this subject. The focus would be on the anterior segment of the eyeball and its surrounding tissues which includes the eyelids, lacrimal system, sclera, orbit, conjunctiva, cornea, anterior uvea and lens.

Course Objectives

- To provide a clear understanding of the anatomical construction of the different ocular structures.
- Relate the anatomy of the tissues to their respective physiological function.

Syllabus

UNIT I **8 Hours**

Embryological development of the eye, structure and function of the eyelids and the lacrimal system

UNIT II **10 Hours**

Structure of the cornea and its different layers, function of the layers of the cornea, regenerative capacity of the different layers of the cornea, optical properties of the cornea and mechanisms that maintain its transparency.

UNIT III **10 Hours**

Structure and function of conjunctica, Limbus and its function, Anterior chamber – secretion of aqueous humor

UNIT IV **8 Hours**

Structures and mechanisms regulating aqueous humor drainage, Cause and effect of increased intraocular pressure – glaucoma

UNIT V **8 Hours**

Pharmacodynamics of anti-glaucoma medications, Iris and pupils – neurological control of the pupillary function

Course Outcomes:

- Students upon completing this course, students will identify the ocular structures and have a clear understanding of the anatomy of the various structures of the eye along with their specific function.
- An in-depth knowledge of the different ocular tissues and their components will form the basis for the understanding of pharmacology, ocular diseases, and management.

Text Books:

1. J Fielding Hejtmancik John Nickerson, Academic Press, Molecular Biology of Eye Disease
2. Al Lens, Sheila Coyne Nemeth, Janice K. Ledford, Ocular Anatomy and Physiology, Slack incorporated, 2015 edition 2.

OPTO1081 : Geometrical Optics II

L	T	P	C
3	0	0	3

Preamble:
This course deals with the lens and the physics of image formation. The order of magnification of image and associated aberration can be predicted. The knowledge of formation of image is crucial and essential in diagnosing and suggesting apt solution for many of the problems related to optometry

Course objectives:

- To analyse the formation of image due to combination of lens
- To compare the image formed by lens of varying geometry.

Syllabus:

UNIT I **10 Hours**

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 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 Prentices 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.

Learning Outcomes:
At the end of the topic the student will be able to

- describe Lens and types of lens
- predict the image formed by different types of lens
- analyse sign of Convention imaging by thin convex lens.
- review the front and back vertex power

UNIT II **10 Hours**

Cylindrical Lenses; image formation; relation between cylinder axis and line image orientation. Imaging due to two cylinders in contact with axes parallel. Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; Interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC.

Learning Outcomes:
At the end of the topic the student will be able to

- predict the image formed by cylindrical lens
- compute image formation due to two cylindrical lenses with axes parallel and perpendicular
- analyse interval of sturm

UNIT III **8 Hours**

Spherical lens and a cylindrical lens in contact; spherical equivalent; interval of Sturm and CLC. Sphereo-cylindrical lens notations– plus/minus cylinder form, cross cylinder/meridian form; transformations between them. Field stops and apertures; entrance and exit pupils. Apertures and defocus blur, Receiver/detector diameter; Depth of focus, Depth of field.

Chromatic aberrations; methods of removing chromatic aberrations. Abbe number. Monochromatic aberrations –deviation from paraxial approximation, Difference between ray aberrations and wave-front aberrations. Third order aberrations–spherical aberrations, coma, astigmatism; distortion and curvature of fields, Ways of minimizing spherical aberrations–Pupil-size, bending of lens, shape factor, Lens tilt – astigmatism. Higher order aberrations; introduction to Zernike Polynomials.

Learning Outcomes:
At the end of the topic the student will be able to

- predict the image formed by spherical and cylindrical lenses in contact
- define Aperture, defocus blur and Chromatic aberration
- indicate methods to remove chromatic aberration
- classify aberrations during the formation of aberrations
- propose methods to minimize the aberration.

UNIT IV **8 Hours**

Telescopes– Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages. Microscopes–magnification, tube-length. Gullstrand's Schematic Eye (GSE). Calculation of the power of the cornea, the lens and the eye, axial length, Calculation of the position of the cardinal points, magnification. GSE-Purkinje images and their reflectance. GSE-entrance and exit pupils for a 3mm pupil; ocular aberrations– spherical aberrations and coma, chromatic aberrations.

Learning Outcomes:
At the end of the topic the student will be able to

- define and classify Telescope
- compare different types of telescope
- recall the construction of microscope
- calculate the power of the cornea, the lens and the eye
- propose methods to minimize the aberration.

UNIT V **8 Hours**

GSE–introduction to refractive errors-myopia and hyperopia; corneal curvature; axial length; far point; blur-size calculations; corrections; astigmatism; blur size; circle of least confusion; correction. GSE-Object closer than at infinity; Introduction to accommodation; far-point; near-point; presbyopia; spectacle and contact lens corrections- comparison of magnification.

Learning Outcomes:
At the end of the topic the student will be able to

- define and Gullstrand's Schematic Eye (GSE).
- outline errors-myopia and hyperopia

- calculate the blur-size
- propose methods to correction.

Course Outcomes:
At the end of the course the student will be able to

- To compare the image formed by lens of varying geometry
- predict the image formed by different types of lens
- analyse sign of Convention imaging by thin convex lens
- calculate the power of the cornea, the lens and the eye
- propose methods to minimize the aberration
- outline errors-myopia and hyperopia

Textbooks:

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

Reference Books:

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

OPTO1091: Information Systems and Technology

L	T	P	C
3	0	0	3

Course Description:

This course introduces the student to the building blocks of information systems and their utility in healthcare management systems. The first two units cover the building blocks of the computer system. The students are made aware of the text processing tools and data management systems in the third unit. The fourth module makes the student aware of internet technology and associated risks and internet technology issues. Finally, the last module covers the healthcare informatics and management tools.

Course Objectives:

- To familiarize with the working principle of computers and their component
- To introduce the computer software systems and their functionality.
- To learn and utilize MS-office tools and their functionality.
- To learn and utilize the world wide web.
- To learn about the medical informatics used in the management of optometry records.

UNIT I **8 Hours**

Introduction to Computers: Computer Generations & Classifications: Evolution of computers, Classification of Computers. Central Processing Unit, Random access memory, storage systems, Input devices: Keyboard, pointing devices, scanning devices, Data acquisition sensors, Output devices: Monitors, printers.
Learning outcome:
After completion of this unit, the student will be able to

- understand the basics of the computer system (L1)
- identify the components of computers (L2)

UNIT II **8 Hours**

Introduction to Computer Software, type of different software, standard application software, overview of proprietary software, an overview of Operating System Concepts, the function of operating systems, type of operating systems, File management, memory management, process management, device management, popular operating systems. Windows 7.
After completion of this unit, the student will be able to

- Understand the overview of computer software (L1)
- Uses of software for performing a specific tasks (L3)
- Troubleshoot the software-related issues. (L3)

UNIT III **8 Hours**

Introduction, MS-word systems, MS-excel systems, MS PowerPoint systems, MS access systems.

After completion of this unit, the student will be able to

- understand the overview of different tools available in MS office(L1)
- uses of MS-EXCEL for performing a specific tasks (L3)
- understand the organization of data in database management systems(L2)
- use MS-ACCESS to store and retrieve data from the table (L3)

UNIT IV **8 Hours**

Internet and Its Working: History of the Internet, understanding WWW, Web browsers, Protocols used for Internet, Internet address, other internet services: Emails, Instant Messaging, FTP. Internet and network attacks: Virus, worms, trojan and rootkits, safeguard against computer virus and other malware, DOS attack, spoofing, backdoors, Firewalls

After completion of this unit, the student will be able to
- understand the worldwide web, its protocols, and its threats(L1)
- uses of the world wide web (L3)
- protect and troubleshoot the system in case of threats of attack. (L3)

UNIT V **8 Hours**

Biomedical Informatics: Emerging Discipline, Biomedical data: their acquisition, storage, and use. Electronic Health records, Imaging management, and display, Telehealth,

After completion of this unit, the student will be able to
- understand how computers are used in medical informatics(L1)
- utilize the PACS imaging system to store and retrieve ophthalmic images (L3)
- understand the characteristics of different software used in optometry. (L1)
- use the optometry software for their specified task. (L3)

Course Outcomes:

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

- To learn and utilize MS-office tools and their functionality
- identify the components of computers
- Troubleshoot the software-related issues
- uses of MS-EXCEL for performing a specific task
- understand how computers are used in medical informatics

Text Books:

1. Balagurusamy, E., Fundamentals of Computer by, Tata McGraw Hill Education Pvt. Ltd, New Delhi
2. Shelly, Gary B. Discovering Computer Fundamentals. Shelley Cashman Series, 2010.
3. Shortliffe, E. H., Shortliffe, E. H., Cimino, J. J., & Cimino, J. J. (2014). Biomedical informatics: computer applications in health care and biomedicine. Springer..

Reference Books:

1. Vikas Gupta, Comdex Information Technology Course Tool Kit, Wiley Dreamtech, 2009.

2. ITL Education Solutions limited, Introduction to Information Technology, Pearson Education, 2006.
3. Joos, I., Wolf, D., & Nelson, R. (2019). Introduction to computers for healthcare professionals. Jones & Bartlett Learning.

Web References:

1. Health informatics specialization, https://www.coursera.org/specializations/health-informatics
2. Fundamentals of Computers, https://onlinecourses.swayam2.ac.in/cec21_cs15/preview
3. Introduction to MS-office, https://www.youtube.com/watch?v=yCVy5Kw0l8s
4. Interprofessional health informatics, https://www.coursera.org/learn/health-informatics-professional

OPTO1101 Functional English and Communication

L	T	P	C
3	0	0	3

Preamble:

The course is designed to help learners enhance their English language skills and communicate efficiently and effectively. It focuses on all four language skills with an emphasis on communication in a healthcare environment in general and optometry in particular. It familiarizes learners with the kind of language they would need every day at work by using real healthcare scenarios in the activities and materials.

Course Objectives:

- Help learners understand and apply the rules of the English language in speech and writing (L2)
- Equip learners with the knowledge of the sub-skills and strategies of effective reading and active listening with specific reference to workplace scenarios in the healthcare sector (L3)
- Familiarize learners with the conventions of formal and informal communication (oral and written) and enable them to communicate (in speech and writing) with confidence, competence and clarity in professional contexts (L3)
- Prepare learners to appear for globally recognized English language tests for professionals in the healthcare sector (L3)

Syllabus:

UNIT I **8 Hours**

Introduction: Practical approach to recognizing significant differences between English and one's native language: use of articles, prepositions, verb tense and voice

Listening: Listen to recorded extracts and identify specific information to complete notes

Speaking: Impact of pronunciation, intonation and accent on how clearly the listener can hear and understand what the speaker is saying; relationship-building: the importance of the choice of opening to the conversation; demonstration of empathy and respect

Reading: Locate specific information from short texts in a quick and efficient manner

Writing: Take/make notes and summarise clearly and concisely what is heard in short audio extracts and reading texts

Learning Outcomes:

By the end of this Unit, the student will be able to -

- Obtain relevant information from short extracts of spoken and written content (L2)
- Initiate a conversation that leads to professional relationship-building and write short structured summaries of content from listening and reading texts (L2)

UNIT II **8 Hours**

Listening: Strategies to develop a range of listening skills, such as identifying specific information, detail, and gist

Speaking: Significance of speed and smoothness of the speaker's speech on the listener's understanding; incorporating the patient's perspective; involving the patient in the conversation

Reading: Identify the detail, gist or main point of short texts related to healthcare in general and eye care in particular

Writing: Draft a letter/email communicating clear information (e.g.: a referral letter) with a focus on purpose and content

Learning Outcomes:

By the end of this Unit, the student will be able to -

- understand spoken and written content relevant to the field and answer questions based on overall understanding of the texts read/listened to (L3)
- participate confidently in role-plays based on workplace contexts and draft short structured letters/emails (L3)

UNIT III **8 Hours**

Listening: Identify the opinion or purpose of short extracts from the healthcare workplace.

Speaking: Emphasis on the speaker's language, tone and professionalism to ensure the listener's understanding and comfort; organise the information provided and introduce new topics for discussion in the course of a consultation or demonstration

Reading: Identify the detail, gist or main point of texts sourced from the healthcare workplace including extracts from policy documents, hospital guidelines, manuals or communications such as emails or memos

Writing: Communicating through letters/email with clarity and conciseness; accuracy of the grammar, vocabulary, spelling and punctuation; editing one's own and others' drafts for language and clarity

Learning Outcomes:

By the end of this Unit, the student will be able to -

- comprehend spoken and written content relevant to the healthcare workplace and understand the conventions of different medical text types as well as the presentation of numerical and textual information. (L2)
- demonstrate professionalism in oral communication through role-plays related to specific workplace scenarios and write clear, concise emails in error-free language. (L3)

UNIT IV **8 Hours**

Listening: Strategies for active listening to understand opinion and the speaker's purpose

Speaking: Focus on grammatical accuracy and vocabulary choices in speech; type of questions that can be asked to indicate interest in the responses of the listener/patient

Reading: Identify detailed and implied meaning in longer texts on topics of interest to healthcare professionals

Writing: Organization of content in writing; use of suitable signposting language; achieving clear structure and coherence in writing

Learning Outcomes:

By the end of this Unit, the student will be able to -

- adopt suitable strategies for active listening and inferential reading to understand and answer questions regarding the speaker's/writer's intent and opinion/ attitude (L3)
- ask and answer questions orally in an insightful manner and demonstrate understanding of structure and coherence in independent writing tasks. (L3)

UNIT V **8 Hours**

Listening: Listen actively and follow a recorded presentation or interview on a range of accessible healthcare topics

Speaking: Provide relevant information and check if the information is being understood clearly by the listener/patient

Reading: Identify the writer's purpose and opinion in longer texts on topics of interest to healthcare professionals

Writing: Focus on the use of appropriate register and tone in written communication

Learning Outcomes:

By the end of this Unit, the student will be able to

- gauge listener responses during professional conversations and gain insights into the writer's intent and attitude while reading
- convey the content clearly in oral communication and guide the listener/patient to provide the required information, and apply knowledge of appropriate register and tone in written communication (L3)

Course Outcomes:

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

- understand the linguistic and professional aspects of spoken and written communication in clinical contexts (L2)
- build upon and improve communicative abilities in English across the skills

of listening, reading, writing and speaking in English (L3)
- follow the given rubrics and give peer feedback to fellow learners on their performance in role plays as well as their responses to writing tasks. (L3)
- take a global English Skills Test relevant to their profession if required/desired (L3)

Reference Books:

1. Cunningham, S., Moor, P., and Eales, F. (2007) New Cutting Edge Pre-Intermediate. Pearson Longman.
2. McCarthy, M., O'Dell, F., Mark, G. (2005) English Vocabulary in Use. Spain: Cambridge University Press.
3. Murphy, Raymond. (2015) Essential Grammar in Use. Cambridge University Press.
4. Sanjay Kumar and Pushp Lata. (2018) Communication Skills: A Workbook. OUP.

Internet Resources:

Listening and Speaking:

- ABC – All in the Mind
- ABC – Health Minutes
- ABC – Health Report
- ABC – Life Matters
- BBC – Health
- BBC – Health Check
- BBC – Inside Health
- BBC – Science in Action
- Speaking Video Samples

Reading:

- ABC health newsletter
- New England Journal of Medicine
- Science Magazine for the American Association for the Advancement of Science
- British Medical Journal
- Journal of the American Medical Association
- Medical Journal of Australia
- Free Medical Journals
- OMICS International

Language Skills, Grammar, Vocabulary and Dictionaries:

- https://www.grammarly.com/blog/
- https://learnenglishteens.britishcouncil.org/
- https://eslflow.com/
- https://www.englishclub.com/
- https://freerice.com/categories/english-vocabulary
- https://www.oxfordlearnersdictionaries.com/
- https://dictionary.cambridge.org/

Activities/Tasks:

Listening: Listen to recorded extracts of talks, lectures, team briefings, demonstrations, handovers, and health professional-patient dialogues/consultations and answer questions of varied types such as notes completion, gap filling, MCQs, and very short answers using the information heard

Speaking: Primary focus on role-plays based on workplace contexts, presentations to give a demonstration of procedures/products; peer feedback and instructor feedback would be part of every activity

Reading: Scaffolding activities to help learners understand the conventions of different medical text types, presentation of numerical and textual information, and identify the details. Tasks would also include questions focused on the relationship between ideas at sentence and paragraph level, lexical references and complex phrases within the text. Students would be expected to answer questions of varied types such as notes completion, gap filling, MCQs, and very short answers.

Writing: Collaborative tasks, guided writing tasks, and independent writing tasks would be included in a phased manner; students would be given practice in drafting written communication, editing and proofreading their drafts to avoid language errors as well as to check for tone and agreement with the conventions of professional communication.

Assessment and Evaluation

Combination of formative and summative assessments

Listening: A range of listening skills (such as identifying specific information, detail, gist, opinion or the speaker's purpose) will be assessed through note-completion tasks, gap fills, multiple-choice questions, and questions that demand response in the form of short answers.

Reading: Reading tests assess the ability of the learners to skim and scan quickly across different texts on a given topic in order to locate specific information; understand the detail and the gist/main idea of complex texts commonly found in the healthcare workplace; comprehend both explicit and implied meaning as well as the attitude or opinion presented in longer texts.

Speaking and Writing: Speaking and writing assessments take into account the level of task accomplishment and will be assessed on the basis of detailed rubrics using the following criteria: purpose, content, conciseness and clarity, organisation of thoughts/points, tone and language, as well as the pace of speech (for speaking assessment).

OPTO1111 Ocular biology (Anterior segment) I Lab

L	T	P	C
0	0	2	1

List of Experiments:

1. Dissection of bovine/rabbit/human eyeballs
2. Measurement of corneal edema
3. Lab visit to KAR campus – visualization of cells
4. Measurement of tear secretion
5. Measurement of TBUT

OPTO1121 Geometrical Optics II Lab

L	T	P	C
0	0	2	1

1. f & μ of convex lens (f by u-v and shift method)
2. f& μ of concave lens (f of concave lens by u-v method, combined lens u-v method, R -
   Boy's method)
3. μ of the prism (i-d curve)
4. μ of slab - shift method (traveling microscope)
5. μ of liquid - shift method (traveling microscope)
6. f of convex of mirror
7. f of concave mirror (u-v graph)
8. Verification of laws of reflection - plane mirror.
9. Verification of laws of refraction - glass slab - pin method (μ by lateral shift)
10. Resolving power of telescope.
11. Photodiode – characteristics.
12. Plank’s constant.

OPTO1131 Clinical examination techniques II Lab

L	T	P	C
0	0	2	1

Course Description:

Course Aim: Students receive reinforcement of the optometry clinical technique/s taught in clinical examination techniques I lab and will be trained in additional optometry clinical technique/s of comprehensive eye examination. This course is also intended to facilitate extensive skill-oriented hands-on practice and a base of knowledge on documentation and interpretation of the optometry clinical technique/s.

Course Objectives:

- This course is a fundamental course on which to base the subsequent optometric clinical training which happens in second year and during patient-care observation.

Syllabus:

Eliciting clinical history

- Eliciting and documentation of detailed clinical history in the following patient profiles (known/suspected): a) Corneal disorders b) Glaucoma c) Retinal disorders d) Injury cases
- Making tentative differential diagnosis

Visual acuity measurement

c) Visual acuity measurement for far distance

- Visual acuity measurement for far distance in an adult patient with only ocular disability by using appropriate chart and documentation of the findings
- Visual acuity measurement for far distance in children with only ocular disability by using Lea symbols chart and documentation of the findings
- Testing distance conversions & assigning visual acuity scores

d) Visual acuity measurement for near distance

- Visual acuity measurement for near distance in an adult patient with only ocular disability by using appropriate chart and documentation of the findings
- Visual acuity measurement for near distance in children with only ocular disability by using Lea symbols chart and documentation of the findings
- Testing distance conversions & assigning visual acuity scores

Refraction

a) Manual Lensometry

- Measurement of the refractive power of the single vision spectacles using manual lensometer
- Measurement of the refractive power of the bifocal spectacles using manual lensometer

b) Objective retinoscopy

- Static dry retinoscopy on an eye with clear media for any given spherical ametropia and its documentation
- Static dry retinoscopy on an eye with clear media for any given regular astigmatic patients and its documentation
- Static wet retinoscopy on an eye with clear media for any given spherical ametropia and/or regular astigmatic patients in adult patients or children using cycloplegic eye drops wherever indicated

c) Subjective retinoscopy

- Determining the endpoint of spherical refraction/refractive error using Maximum plus Maximum Visual Acuity (MPMVA) technique
- Determining the endpoint of spherical refraction/refractive error using Duochrome technique
- Determining the endpoint of astigmatic refraction/refractive error using Jackson's cross cylinder (JCC)
- Determining the endpoint of refraction/refractive error using binocular refraction and balancing techniques
- Determining the endpoint of refraction/refractive error using post mydriatic test (PMT)
- To write a suitable spectacle prescription.

Anterior segment examination

d) Slit lamp bio microscopy

- Examination of the anterior segment ocular structures using slit lamp biomicroscope by diffuse, direct focal, in-direct and retro illumination techniques
- Examination of the anterior segment ocular structures using slit lamp biomicroscope by tangential, illumination techniques
- Examination of the anterior segment ocular structures using slit lamp biomicroscope by specular reflection illumination techniques
- Examination of the anterior segment ocular structures using slit lamp biomicroscope by sclerotic scatter illumination techniques
- Anterior chamber angle evaluation by Van Herrick's technique and grades used for angle estimation

e) Measurement of Intraocular Pressure (IOP)

- Measurement of intraocular pressure of the eyeball using slit lamp biomicroscope and Goldmann Applanation tonometer

f) Keratometry

- Instrumentation and labeling the parts of the manual Keratometer instrument, its operating principles and optics of the manual Keratometer instrument
- Measurement of the anterior surface corneal curvature in spherical and regular astigmatic eyes using manual Keratometer and appropriate documentation of the findings

Motor examination

a) Examination of extra-ocular muscle balance

- Demonstration of extra-ocular muscle balance testing procedure using Broad H test

- Interpretation of the findings and generation of the documentation

b) Evaluation of ocular deviation

- Evaluation of ocular deviation using cover/uncover/alternate tests and comment on phoria and tropia with the direction of deviation
- Evaluation of ocular deviation using corneal reflex test and comment on phoria and tropia with the direction of deviation

Course outcomes:
After successful completion of this course student should be able to:

- know the application and procedure of the optometry clinical technique/s and/or instrument/s
- explain and demonstrate the procedure of the optometry clinical technique/s and/or instrument/s
- perform the procedure of optometry clinical technique/s and/or instrument/s under supervision
- analyze the findings and produce the documentation of the optometry clinical technique/s and/or instrument/s
- compare normal and abnormal findings and generate the interpretation of the optometry clinical technique/s and/or instrument/s

Reference books:

1) Clinical procedures in optometry by J.Boy E. Eskridge, John F. Amos, Jimmy D. Bartlett. Lippincott Williams & Wilkins 1991
2) Borish's Clinical Refraction William J. Benjamin W.B. Saunders Company 1998
3) Primary Care Optometry Theodore Grosvenor Butter Worth 225 H.A 01801-2041 1996
4) Clinical Ophthalmology : A Systematic Approach, 5th Edition Jack J Kanski Butterworth - Heinemann 2003