UNIVERSITY OF THE PUNJAB

NOTIFICATION

It is hereby notified that the Syndicate at its meeting held on 28-03-2025 has approved the recommendations of the Academic Council made at its meetings dated 27-01-2025 regarding Curriculum/Schemes of Studies/Syllabi/Courses of Reading of following Programs prepared in the light of HEC's Undergraduate Education Policy, 2023 w.e.f. Session, 2025 to be offered at the Department of Allied Health Sciences:-

i. BS in Medical Laboratory Technology (4-years Program)
ii. BS in Audiology (4-years Program)
iii. BS in Optometry & Vision Sciences (4-years Program)
iv. Doctor of Physiotherapy (5-years Program)

The Syllabi and Scheme of Studies of above Programs are enclosed herewith as Annexure-'A'.

Sd/-
Registrar

Admin. Block,
Quaid-i-Azam Campus,
Lahore.
No. D/3707 /Acad. **Dated: 14-5- /2025.**

Copy of the above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Health Sciences
2. Chairman, Department of Allied Health Sciences.
3. Controller of Examinations
4. Director, IT for placement at website
5. Secretary to the Vice-Chancellor
6. Private Secretary to the Registrar
7. Assistant Registrar (Statutes)
8. Admin. Officer (Syllabus)

14/5/25

Assistant Registrar (Academic)
for Registrar

Program Curriculum

BS OPTOMETRY & VISION SCIENCES

Department of Allied Health Sciences

University of the Punjab

Lahore.

Programme	Optometry & Visual Sciences				
Duration	4-Years	**Semesters**	**8**	**Credit hours**	**142(114+28)**
Department	**Department of Allied Health Sciences**				
Faculty	**Faculty of Health Sciences**				

Department Introduction

The Department of Allied Health Sciences, established in 2017 within the umbrella of the Faculty of Health Sciences at the University of the Punjab, Lahore, offers comprehensive programs in Doctor of Physical Therapy (DPT) and various Allied Health Sciences. These programs are designed to provide students with a strong foundation in healthcare, preparing them for impactful careers in the ever-evolving medical field.

Department Vision

The vision of the Department of Allied Health Sciences is to be a leading institution in health education, fostering innovation and excellence in allied health practices. We aim to develop highly skilled, compassionate professionals who will contribute to improving healthcare outcomes through evidence-based practices, research, and holistic patient care. Our commitment is to empower students with the knowledge, critical thinking, and practical skills necessary to excel in diverse healthcare settings, promote health and well-being, and advance the field of allied health sciences globally.

Department Mission

The mission of the Department of Allied Health Sciences is to provide high-quality education and training in the fields of Doctor of Physical Therapy (DPT) and Allied Health Sciences. We are dedicated to fostering a supportive learning environment that emphasizes academic excellence, hands-on clinical experience, and research-driven innovation. Our goal is to equip students with the necessary skills, knowledge, and ethical values to become competent healthcare professionals. Through collaboration, community engagement, and a commitment to lifelong learning, we aim to improve healthcare delivery, promote wellness, and contribute to the advancement of the allied health professions.

Department Goals

The goals of the Department of Allied Health Sciences are:

1. **Academic Excellence**: To deliver high-quality, evidence-based education that prepares students for professional practice in allied health fields.
2. **Skilled Workforce Development**: To develop competent, compassionate, and ethical healthcare professionals through comprehensive programs in DPT and Allied Health Sciences.
3. **Clinical Competence**: To provide hands-on clinical training that enhances students' practical skills and enables them to deliver effective patient care.
4. **Research and Innovation**: To foster a culture of research and critical thinking, encouraging students and faculty to contribute to advancements in healthcare practices.
5. **Community Engagement**: To actively engage with local and global communities to address healthcare challenges, promote wellness, and improve patient outcomes.
6. **Lifelong Learning**: To cultivate an environment of continuous learning, professional development, and leadership within the allied health professions.
7. **Global Contribution**: To produce graduates who are prepared to meet the evolving healthcare needs and contribute to the global health workforce.

Program Introduction

The Department offers an extensive BS Optometry and Vision Sciences curriculum. Optometry is a healthcare profession concerned with examining, diagnosing, and treating the human visual system. It is committed to giving students a solid foundation in vision sciences, optometry, and eye care. The department boasts cutting-edge facilities and a group of knowledgeable instructors dedicated to

providing prospective optometrists with top-notch instruction and training. The emphasis is very much on the optometric service to patients.

Program Objectives

The objectives of the Optometry and Vision Sciences program are:

1. It aims to equip students with a solid understanding of the principles and practices of optometry.
2. A combination of theoretical knowledge and practical training, the program aims to develop students' skills in assessing, diagnosing, and managing various eye conditions and vision disorders.
3. The program emphasizes the importance of preventive eye care and promotes a patient- centered approach to vision health.
4. Increase the coverage of comprehensive eye care and ensure quality and equity while delivering these services.
5. Initiate primary eye care and integrate primary eye care into primary health care.

Market Need / Rationale of the Program

Market Need and the Optometry & Vision Science Program's Justification:

To meet the growing need for qualified healthcare workers, an Optometry & Vision Sciences (OPVS) curriculum must be established. The goal of this program is to give students the technical know-how and expertise needed to become eye care professionals, who are vital members of the healthcare system. A thorough evaluation of the market need for this program is provided below, emphasizing the arguments in favor of its launch.

1. Prospective Program Participants

Knowing prospective students' interests, professional goals, and academic preparedness is crucial to assessing the need for the OPVS program.

Important Things to Think About:

Career Needs: As the healthcare sector grows internationally, there is a growing need for analytical and diagnostic services. Medical occupations frequently pique students' attention, although they can favor positions that don't directly involve patient care. In positions like clinical laboratory technologist, medical researcher, and laboratory supervisor, OPVS provides a great opportunity to get into the healthcare industry.

Subject Interest: This program is likely to appeal to students who are interested in science, especially those who have a passion for biology, chemistry, and health sciences. The most prevalent eye disease, Cataracts, has brought attention to the vital function of ophthalmic diagnosis and increased interest in healthcare jobs.

Student Demographics: High school graduates interested in health sciences, professionals wishing to change occupations, or people looking for specialization in the healthcare industry are all possible candidates for the OPVS program.

2. Possible Companies:

Key players in the OPVS program's success will be employers in the healthcare industry, both public and private. By determining their requirements, the program is guaranteed to meet industry standards.

Important Things to Think About:

Necessary Skill Set: Companies demand that OPVS graduates have both soft skills like teamwork, critical thinking, and attention to detail as well as technical Eye care abilities like low vision as well as refractive errors using diagnostic equipment, and interpreting results.

Industry Projections: As the population ages, medical technology progresses, and diagnosis becomes more important, the optometry & vision sciences sector is anticipated to expand dramatically. The rise in infections, chronic illnesses, and public health concerns is expected to drive up demand for eye care

services, according to the World Health Organization (WHO) and other health organizations.
Employment Opportunities: Qualified optometrists are constantly needed in hospitals, clinics, public health agencies, and research facilities in both urban and rural areas. There are plenty of career prospects in government hospitals, private clinics, non-governmental organizations, pharmaceutical firms, and research facilities.
Present and Future Prospects: OPVS graduates will be well-positioned for professional progression and prospects in cutting-edge medical research and diagnostics thanks to developing fields like genomics, molecular biology and personalized medicine.

3. Scholarly Forecasts

It is crucial to look at both domestic and global trends in comparable academic programs in order to evaluate the OPVS program's feasibility.

Important Things to Think About:
National and International Offerings: As the need for healthcare workers rises, more students are enrolling in Optometry & Vision Sciences programs offered by numerous universities and technical institutions across the globe. OPVS training programs continue to be funded by nations with established healthcare systems, including the US, Canada, Australia, and the UK.
Program Trends: The curriculum is being impacted by developments in laboratory technology, including automation, molecular diagnostics, and artificial intelligence in healthcare. The significance of medical laboratory specialists in upcoming healthcare systems is further highlighted by the growth of telemedicine and remote diagnostics.
Program Analogies: Examine current OPVS initiatives both domestically and abroad. Examine their course offerings, industry collaborations, and student results to make sure the suggested program can provide a relevant and competitive education.

4. Teachers:

Delivering a top-notch OPVS program that satisfies industry demands and academic requirements requires a competent and knowledgeable faculty.
Important factors to take into account include:
Faculty Credentials: Academics should hold graduate degrees in ophthalmology, optometry, biological sciences, or similar disciplines.
Program Trends: The curriculum is being impacted by developments in Optometry & Vision Sciences, including automation, molecular diagnostics, and artificial intelligence in healthcare. Additionally, the growth of remote diagnostics and telemedicine.
Capacity and Resources: The program needs skilled instructors who can instruct students in advanced methods, diagnostic processes, and specialty topics such as Low vision, auto refraction, retinoscopy as well as orthoptics. Faculty members ought to participate in professional growth and research as well.
Professional Development: To stay abreast of developments in Optometry & Vision Sciences, faculty members should have access to continuous training. They should also be given the chance to work with research companies and medical institutes.

5. Physical Infrastructure:
Having adequate physical resources to support both theoretical and practical training is essential to the OPVS program's success.

Lab Facilities: The curriculum needs to be backed by up-to-date, well-equipped labs where students can practice clinical optometry, Vision sciences, and Molecular Biology. Safety equipment, automated analyzers, microscopes, and diagnostic tools should all be present in laboratories.
Library Resources: To enhance students' learning, a thorough library that provides access to up-to-date textbooks, scholarly publications, and internet databases (such PubMed, Scopus, etc.) is essential.
Technology Infrastructure: Digital resources including learning management systems (LMS), lab

simulation software, and access to industry-standard diagnostic platforms should all be included in the curriculum.

Conclusion

The Optometry & Vision Sciences program was established in response to the growing need for skilled healthcare workers and the expansion of the global healthcare sector. This program's necessity and feasibility are demonstrated by a robust labor market, changing industrial demands, academic trends, skilled instructors, and cutting-edge facilities. The curriculum will close a significant gap in the growth of the healthcare workforce by giving students the technical know-how and practical experience needed in diagnostic labs. This will give students job security and employers the qualified workers they seek.

Admission Eligibility Criteria

- 12 Years of Study completed
- Study Program/Subject F.Sc. Pre Medical or equivalent
- Entry Test

Categorization of Courses as per HEC Recommendation and Difference

Semester	Courses	Category(Credit Hours)					
		Core Courses	Basic Courses	Major Electives	Minor Electives	Any Other	Semester Load
1	7	1(0)	4(10)	-	2(6)		16 (13+3)
2	8	1(1)	4(9)	2(6)	1(3)		19 (16+3)
3	8	1(0)	3(9)	3(8)	1(3)		20 (16+4)
4	8	1(1)	2(4)	5(12)	-		17 (15+2)
5	8	1(0)	-	7(19)	-		19 (16+3)
6	7	1(1)	-	6(17)	-		18 (16+2)
7	7	2(3)	-	4(11)	1(3)		17 (10+7)
8	7	2(4)	-	5(12)			16 (12+4)
PU	**60**	**10**	**32**	**85**	**15**		**142(114+28)**
HEC Guidelines		**6**	**32**	**≥72**	**≥12**		
Difference (HEC &) PU		**4**	**0**	**17**	**3**		

**Core: Compulsory, Basic: Foundation, Major Electives: Professional Minor Electives: Specialization*

Note: The course/column heads are customizable according to nature and level of the program.

Scheme of Studies

S. #.	Course Code	Title of the Course	Credit Hours
1.	GENG-101	Functional English	3(3+0)
2.	GISL-101 / GETH-101	Islamic Studies / Ethics (for Non-Muslims)	2(2+0)
3.	GICP-101	Ideology & Constitution of Pakistan	2(2+0)
4.	OVS-101	Biochemistry	3(2+1)
5.	OVS-102	Anatomy	3(2+1)
6.	OVS-103	Physiology	3(2+1)
7.	HQ-001	Tarjuma-e-Quran	0
8.	GQR-101	Quantitative Reasoning-I	3(3+0)
9.	OVS-104	Behavioral Sciences	2(2+0)
10.	OVS-105	Medical Sociology	2(2+0)
11.	OVS-106	General Pathology	3(2+1)
12.	OVS-107	Eye Anatomy	3(2+1)
13.	OVS-108	Eye Physiology	3(2+1)
14.	OVS-109	Pakistan Studies	2(2+0)
15.	HQ-002	Tarjuma-e-Quran	1
16.	GQR-202	Quantitative Reasoning-II	3(3+0)
17.	GENG-201	Expository Writing	3(3+0)
18.	GICT-201	Applications of ICT	3(2+1)
19.	OVS-201	Human Genetics	3(2+1)
20.	OVS-202	Introduction to Pharmacology	3(2+1)
21.	OVS-203	Biostatistics	3(2+1)
22.	OVS-204	Visual Optics	2(2+0)
23.	HQ-003	Tarjuma-e-Quran	0
24.	GENT-101	Entrepreneurship	2(2+0)
25.	GCCE-101	Civics and Community Engagement	2(2+0)
26.	OVS-205	Physical & Geometric Optics	3(2+1)
27.	OVS-206	Ophthalmic Pharmacology	2(2+0)
28.	OVS-207	Molecular Biology	3(2+1)
29.	OVS-208	Community Optometry	2(2+0)
30.	OVS-209	Pediatric Optometry	2(2+0)
31.	HQ-004	Tarjuma-e-Quran	1
32.	OVS-301	Basic Clinical Skills in Ophthalmology	03 (2+1)
33.	OVS-302	Introduction to skills for Advanced Visual Function Assessment	03 (2+1)
34.	OVS-303	Public Health & Community Ophthalmology	03 (3+0)
35.	OVS-304	Low Vision & Retinoscopy	03 (2+1)
36.	OVS-305	Ocular Diseases Anterior Segment	03 (3+0)
37.	OVS-306	Instrument Optics	02 (2+0)
38.	OVS-307	Dispensing Optics	02 (2+0)
39.	HQ-005	Tarjuma-e-Quran	0
40.	OVS-308	Ocular Diseases Posterior Segment	03 (3+0)
41.	OVS-309	Clinical Refraction	03 (2+1)
42.	OVS-310	Contact lenses	03 (3+0)
43.	OVS-311	Clinical Optometry & Examination	03 (2+1)
44.	OVS-312	Ophthalmic Dispensing	03 (3+0)
45.	OVS-313	Occupational Optometry	02 (2+0)
46.	HQ-006	Tarjuma e Quran	1
47.	OVS-401	Clinical Optics and Vision Sciences	03 (2+1)

48.	OVS-402	Orthoptics	3(2+1)
49.	OVS-403	Optometric Equipments & Procedures	02 (2+0)
50.	OVS-404	Bioinformatics	03 (2+1)
51.	OVS-405	Research Methodology & Skill Enhancement	03 (2+1)
52.	OVS-406	Internship	03 (0+3)
53.	HQ-007	Tarjuma e Quran	0
54.	OVS-407	Capstone Project	03 (0+3)
55.	OVS-408	Clinical Orthoptic and Binocular Vision	03 (2+1)
56.	OVS-409	Ocular Therapeutics	02 (2+0)
57.	OVS-410	Systemic Diseases & Neuro Ophthalmology	03 (3+0)
58.	OVS-411	Scientific Writings	01 (1+0)
59.	OVS-412	Biosafety & Risk Management	03 (3+0)
60.	HQ-008	Tarjuma e Quran	1
Total Credit Hours			**142(114+28)**

Scheme of Studies / Semester-wise workload

#	Code	Course Title	Course Type	Prerequisite	Credit Hours		Total
Semester I							
1.	GENG-101	Functional English	General		3(3+0)		
2.	GISL-101 / GETH-101	Islamic Studies / Ethics (for Non-Muslims)	General		2(2+0)		
3.	GICP-101	Ideology & Constitution of Pakistan	General		2(2+0)		
4.	OVS-101	Biochemistry	General		3(2+1)		
5.	OVS-102	Anatomy	Interdisciplinary		3(2+1)		
6.	OVS-103	Physiology	Interdisciplinary		3(2+1)		
7.	HQ-001	Tarjuma-e-Quran	Compulsory		0		
Total Credit Hours							16 (13+3)
Semester II							
1.	GQR-101	Quantitative Reasoning-I	General		3(3+0)		
2.	OVS-104	Behavioral Sciences	General		2(2+0)		
3.	OVS-105	Medical Sociology	General		2(2+0)		
4.	OVS-106	General Pathology	Interdisciplinary		3(2+1)		
5	OVS-107	Eye Anatomy	Major		3(2+1)		
6.	OVS-108	Eye Physiology	Major		3(2+1)		
7.	OVS-109	Pakistan Studies	General		2(2+0)		General
8.	HQ-002	Tarjuma-e-Quran	Compulsory		1		
Total Credit Hours							19 (16+3)
Semester III							
1.	GQR-202	Quantitative Reasoning-II	General		3(3+0)		
2.	GENG-201	Expository Writing	General		3(3+0)		
3.	GICT-201	Applications of ICT	General		3(2+1)		
4.	OVS-201	Human Genetics	Major		3(2+1)		
5.	OVS-202	Introduction to Pharmacology	Interdisciplinary		3(2+1)		
6.	OVS-203	Biostatistics	Major		3(2+1)		
7.	OVS-204	Visual Optics	Major		2(2+0)		
8.	HQ-003	Tarjuma-e-Quran	Compulsory		0		
Total Credit Hours							20(16+4)

#	Code	Course Title	Course Type	Prerequisite	Credit Hours		Total
Semester IV							
1.	GENT-101	Entrepreneurship	General		2(2+0)		
2.	GCCE-101	Civics and Community Engagement	General		2(2+0)		
3.	OVS-205	Physical & Geometric Optics	Major		3(2+1)		
4.	OVS-206	Ophthalmic Pharmacology	Major		2(2+0)		
5.	OVS-207	Molecular Biology	Major		3(2+1)		
6.	OVS-208	Community Optometry	Major		2(2+0)		
7.	OVS-209	Pediatric Optometry	Major		2(2+0)		
8.	HQ-004	Tarjuma-e-Quran	Compulsory		1		
Total Credit Hours							17 (15+2)
Semester V							
1.	OVS-301	Basic Clinical Skills in Ophthalmology	Major		03 (2+1)		
2.	OVS-302	Introduction to skills for Advanced Visual Function Assessment	Major		03 (2+1)		
3.	OVS-303	Public Health & Community Ophthalmology	Major		03 (3+0)		
4.	OVS-304	Low Vision & Retinoscopy	Major		03 (2+1)		
5.	OVS-305	Ocular Diseases Anterior Segment	Major		03 (3+0)		
6.	OVS-306	Instrument Optics	Major		02 (2+0)		
7.	OVS-307	Dispensing Optics	Major		02 (2+0)		
8.	HQ-005	Tarjuma-e-Quran	Compulsory		0		
Total Credit Hours							19 (16+3)
Semester VI							
1.	OVS-308	Ocular Diseases Posterior Segment	Major		03 (3+0)		
2.	OVS-309	Clinical Refraction	Major		03 (2+1)		
3.	OVS-310	Contact lenses	Major		03 (3+0)		
4.	OVS-311	Clinical Optometry & Examination	Major		03 (2+1)		
5.	OVS-312	Ophthalmic Dispensing	Major		03 (3+0)		
6.	OVS-313	Occupational Optometry	Major		02 (2+0)		
7.	HQ-006	Tarjuma e Quran	Compulsory		1		
Total Credit Hours							19 (12+7)
Semester VII							

#	Code	Course Title	Course Type	Prerequisite	Credit Hours		Total
1.	OVS-401	Clinical Optics and Vision Sciences	Major		03 (2+1)		
2.	OVS-402	Orthoptics	Major		3(2+1)		
3.	OVS-403	Optometric Equipments & Procedures	Major		02 (2+0)		
4.	OVS-404	Bioinformatics	Interdisciplinary		03 (2+1)		
5	OVS-405	Research Methodology & Skill Enhancement	Major		03 (2+1)		
6.	OVS-406	Internship	Compulsory		03 (0+3)		
7.	HQ-007	Tarjuma e Quran	Compulsory		0		
Total Credit Hours							17 (10+7)
Semester VIII							
1.	OVS-407	Capstone Project	Compulsory		03 (0+3)		
2.	OVS-408	Clinical Orthoptic and Binocular Vision	Major		03 (2+1)		
3.	OVS-409	Ocular Therapeutics	Major		02 (2+0)		
4.	OVS-410	Systemic Diseases & Neuro Ophthalmology	Major		03 (3+0)		
5	OVS-411	Scientific Writings	Major		01 (1+0)		
6.	OVS-412	Biosafety & Risk Management	Major		03 (3+0)		
7.	HQ-008	Tarjuma e Quran	Compulsory		1		
Total Credit Hours							16 (12+4)

Type of course may be core (compulsory), basic (foundation), major elective (professional), minor elective (specialization) etc.

Research Thesis / Project /Internship		
Details (credit hours, semesters etc.) • Internship (3 Credit Hours) in 7th Semester • Capstone Project (3 Credit Hours) in Final Semester		
Award of Degree		
Degree awarding criteria stating: As per PU undergraduate policy Thesis /Project/Internship (Compulsory) Any other requirement		
NOC from Professional Councils (if applicable)		
The required NOC will be processed accordingly.		
Faculty Strength		
Degree	**Area/Specialization**	**Total**

PhD		1. Human Genetics 2. Molecular Biology 3. Biochemistry 4. Molecular Biology and Molecular Genetics		**5**	
MPhil		1. Molecular Biology		**1**	
Total				**6**	
Present Student Teacher Ratio in the Department					
Total Faculty	**6**	**Total Students**	**NA**	**Ratio**	**NA**
Initially Startup of the Program.					
Course Outlines separately for each course					

Course Outline

Programme	Optometry & Vision Sciences	**Course Code**	**OVS-101**	**Credit Hours**	3(2+1)
Course Title	Biochemistry				

Course Introduction

Biochemistry is the study of the chemical substances and processes that occur in living organisms. It focuses on the structure, function, and role of biomolecules like proteins, carbohydrates, lipids, nucleic acids, and enzymes. Biochemists investigate the chemical reactions that drive biological functions, including the synthesis of biologically active molecules. The field also examines the structure and metabolism of essential compounds, helping to understand how these molecules contribute to life processes. Biochemistry applies physicochemical principles to study macromolecules within living systems, covering topics such as metabolic pathways, enzyme kinetics, and energy production. This discipline plays a key role in medicine, pharmacology, and nutrition, contributing to the development of new therapies, diagnostics, and dietary guidelines. By linking chemistry and biology, biochemistry provides insights into the molecular basis of life and its impact on health and disease.

Learning Outcomes

On the completion of the course, the students will:

- Understand the chemical substances and biochemical processes in living organisms.
- Describe the structure, function, and role of key biomolecules like proteins, carbohydrates, lipids, and nucleic acids.
- Apply physicochemical principles to study metabolic pathways and biological processes.
- Identify key metabolic pathways and explain their role in energy production.
- Explain enzyme function, kinetics, and regulation in biochemical reactions.
- Demonstrate proficiency in laboratory techniques for analyzing biomolecules.
- Understand molecular mechanisms of diseases and apply biochemistry in diagnosis and treatment.
- Understand the synthesis and breakdown of biologically active molecules.
- Apply biochemistry to nutrition, pharmacology, and clinical diagnostics in allied health sciences.
- Develop analytical and problem-solving skills for interpreting experimental data and real-world health scenarios.

	Course Content (Theory)	**Assignments/Readings**
Week 1	Introduction to Biochemistry	Biochemistry Textbook
	pH and pH Scale (Acidity & Alkalinity); Acid-Base Regulation in the Body	Complete exercises on pH scale and buffers
Week 2	Body Buffers and Their Mechanism of Action	Read on body buffers, focus on bicarbonate buffer
	Biochemical Composition and Functions of the Cell; Movement of Materials Across the Cell	Read Chapter on Cellular Structures and Transport
Week 3	Carbohydrates: Biochemical Structure, Function, and Classification (Polysaccharides, Oligosaccharides, Monosaccharides)	Review carbohydrate structures
	Carbohydrate Digestion and Absorption	Solve carbohydrate digestion problems
Week 4	Glycolysis: Introduction, Transport of Glucose into the Cell	Read about glycolysis and glucose transport

	Glycolysis Reactions: Reduction of Pyruvate to Lactate; Energy Yield from Glycolysis	Complete glycolysis pathway exercises
Week 5	Regulation of Glycolysis	Study regulation mechanisms of glycolysis
	Alternate Fates of Pyruvate	Review metabolism of pyruvate and its fates
Week 6	Tricarboxylic Acid Cycle: Reactions of the TCA Cycle	Read about the TCA cycle
	Mechanism of Arsenic Poisoning; Energy Produced by the TCA Cycle	Solve questions on arsenic poisoning and TCA
Week 7	Regulation of the TCA Cycle	Review TCA cycle regulation factors
	Substrates for Gluconeogenesis, Reactions Unique to Gluconeogenesis	Read about gluconeogenesis
Week 8	Regulation of Gluconeogenesis; Glycogen Metabolism	Study glycogen metabolism pathways
	Glycogenesis, Glycogenolysis	Complete exercises on glycogenesis and glycogenolysis
Week 9	Regulation of Glycogenesis and Glycogenolysis	Review the role of hormones in glycogen metabolism
	Irreversible Oxidative Reactions, Reversible Non-Oxidative Reactions	Read about oxidative and non-oxidative reactions
Week 10	Uses of NADPH	Study NADPH functions and its role in metabolism
	Diseases Associated with Carbohydrate Metabolism	Research diseases like diabetes, glycogen storage disorders
Week 11	Amino Acids: Introduction, Structure, Function, and Classification	Review amino acid structures and classification
	Primary Structure of Proteins: Peptide Bond and Folding	Complete protein structure exercises
Week 12	Secondary Structure of Proteins: α-Helices and β-Sheets	Study protein secondary structure in detail
	Tertiary and Quaternary Structure of Proteins; Protein Misfolding	Read on protein folding and misfolding
Week 13	Globular Proteins	Solve exercises on globular proteins
	Globular Hemoproteins: Myoglobin and Hemoglobin	Study hemoglobin and myoglobin structure
Week 14	Structure and Function of Myoglobin, Hemoglobin; Binding of Oxygen to Myoglobin and Hemoglobin	Research oxygen binding kinetics
	Allosteric Effects; Bohr Effect	Review allosteric regulation and the Bohr effect
Week 15	Fibrous Proteins: Collagen and Elastin	Study structure and function of collagen and elastin
	Protein Digestion and Absorption	Solve problems on protein digestion
Week 16	Urea Cycle and Metabolism of Ammonia	Complete urea cycle pathway exercises
	Enzymes: Introduction, Nomenclature, and Properties of Enzymes	Study enzyme classification and properties

Course Content (Lab)		Assignments/Readings
Week 1	pH Determination of Different Solutions	Read Chapter on pH and Buffer Systems from the textbook.
Week 2	Qualitative Determination of Carbohydrates	Read about Carbohydrate Classification and Tests.
Week 3	Molisch's Test for Carbohydrates	Study the Molisch's Test mechanism and its role in identifying carbohydrates.
Week 4	Iodine Test for Starch	Review Iodine Test mechanism and its use for detecting polysaccharides.
Week 5	Benedict's Test for Reducing Sugars	Read about reducing sugars and their reaction with Benedict's reagent.
Week 6	Barfoed's Test for Monosaccharides	Study Barfoed's test for distinguishing monosaccharides from disaccharides.
Week 7	Seliwanoff's Test for Aldoses vs. Ketoses	Review Seliwanoff's reagent reaction with aldoses and ketoses.
Week 8	Osazone Test for Carbohydrates	Study Osazone formation and its role in identifying sugars.
Week 9	Qualitative Determination of Proteins	Study protein structure and tests for protein presence.
Week 10	Ninhydrin Test for Amino Acids and Proteins	Read about the Ninhydrin test for amino acids and proteins.
Week 11	Biuret Test for Proteins	Study the Biuret reagent and its application to peptide bonds.
Week 12	Heavy Metal Test for Proteins	Study the reactions of proteins with heavy metals and their significance.
Week 13	Heat Coagulation Test for Proteins	Review protein denaturation and coagulation upon heating.
Week 14	Helle's Test for Protein Detection	Study the Helle's test for protein detection in biological fluids.
Week 15	Saturation Test for Lipids and Proteins	Read about saturation and its application in biochemical assays.
Week 16	Quantitative Determination of Glucose in Blood by Glucose-Oxidase Method Quantitative Determination of Protein by Biuret Method	Review glucose metabolism and the glucose-oxidase method. Study the Biuret method and protein quantification protocols.

Textbooks and Reading Material

- **Nelson, D. L., & Cox, M. M. (2024).** *Lehninger Principles of Biochemistry* (9th ed.). W.H. Freeman & Company.
- **Berg, J. M., Tymoczko, J. L., & Stryer, L. (2024).** *Biochemistry* (9th ed.). W.H. Freeman & Company.

- **Murray, R. K., Granner, D. K., Mayes, P. A., & Rodwell, V. W. (2024).** *Harper's Illustrated Biochemistry* (35th ed.). McGraw-Hill Education.
- Abali, E. E., Cline, S. D., Franklin, D. S., & Viselli, S. M. (2021). *Lippincott Illustrated Reviews: Biochemistry.* Lippincott Williams & Wilkins.
- Voet, D., Voet, J. G., & Pratt, C. W. (2018). *Voet's Principles of Biochemistry.* Wiley Global Education.
- Karp, G., Iwasa, J., & Marshall, W. (2018). *Karp's Cell Biology.* John Wiley & Sons.
- Berg, J. M., Tymoczko, J. L., Stryer, L. (2024). Biochemistry: Laboratory Manual (9th ed.). W.H. Freeman & Company.
- Devlin, T. M. (2024). Biochemistry Laboratory Manual (12th ed.). Elsevier.
- Nelson, D. L., Cox, M. M. (2024). Lehninger Principles of Biochemistry: Laboratory Manual (9th ed.). W.H. Freeman & Company.

Teaching Learning Strategies

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   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
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Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-102	Credit Hours	3(2+1)
Course Title	Anatomy				

Course Introduction

This course, **Basic Anatomy**, aims to provide students with a fundamental understanding of human anatomy, focusing on the structure of the human body and its systems. The course is designed to familiarize students with the major body structures, organs, and their functions. Students will also learn the relationship between anatomical structures and physiological processes, offering a solid foundation for further studies in health sciences and allied health fields.

Learning Outcomes

On the completion of the course, the students will:

- Gain a Fundamental Understanding of Human Anatomy: Develop knowledge of the structure and organization of the human body.
- Familiarize with Body Systems: Understand the structure and function of the major organ systems such as skeletal, muscular, circulatory, respiratory, digestive, and others.
- Master Anatomical Terminology: Learn and apply key anatomical terms related to body positions, directions, and planes.
- Explore the Relationship between Anatomy and Health: Recognize how anatomical knowledge is applied in diagnosing and treating health conditions in healthcare settings.
- Visualize the Human Body: Use visual aids such as models, diagrams, and 3D tools to understand and identify the body's structures.
- Understand the Levels of Biological Organization: Learn the levels of organization in the body, from cells to tissues, organs, and systems.
- Apply Knowledge to Health Sciences: Build a foundation for further studies in allied health fields by understanding how anatomy relates to physiology and patient care.

Course Content (Theory)		Assignments/Readings
Week 1	**Introduction to Basic Anatomy**: Overview of the course, significance of anatomy in health sciences.	Introduction to Anatomy and Its Importance in Health
	Anatomical Nomenclature: Anatomical terminology, body plan, and structure.	Read article: Fundamentals of Anatomical Nomenclature and Terminology
Week 2	**Life Span of a Human Being**: Developmental stages and anatomical changes over time.	Write a summary on Anatomical Changes Through the Human Life Span
	Structural and Functional Organization of the Body: Cells, tissues, organs, and systems.	Levels of Biological Organization
Week 3	**Terminology and Body Plan**: Understanding body orientation and anatomical planes.	Complete quiz on Anatomical Directions and Planes
	Systematic Anatomy: Overview of systematic anatomy and its relevance in healthcare.	Research paper on Systematic Anatomy and Its Role in Diagnosis
Week 4	**Basic Organization of the Body**: Introduction to body systems and their integration.	Prepare diagram: Basic Organization of the Human Body
	The Skin: Structure of hypodermis, dermis, epidermis; role of the skin in protection and regulation.	Read on Skin Structure and Function
Week 5	**Skin (Cont'd)**: Superficial fascia, deep fascia, structure of nails and hair, types of burns.	Case study on Types of Burns and Treatment
	The Musculoskeletal System: Overview of bones, muscles, and joints.	Write a report on Components of the Skeletal System
Week 6	**The Skeletal System**: Axial and appendicular skeleton, bone ossification, growth, remodeling, and repair.	Study guide: Axial and Appendicular Skeleton

	Main Features of the Skull: Skull features and their views. Shape and regions of the vertebral column.	Diagram: Skull Features and Vertebral Column
Week 7	**Fractures and Reduction Options**: Types of fractures and methods of reduction.	Group discussion: Fracture Types and Treatment
	Bones of the Upper and Lower Limb: Pectoral girdle, pelvic girdle, and their relation to limb movements.	Research paper: Bones of the Pectoral Girdle and Upper Limb
Week 8	**Types of Joints and Movements**: Various types of joints, joint movements, and classifications of synovial joints.	Assignment on Types of Joints and Joint Movements
	Connective Tissue and Cartilage: Components of the connective tissue matrix and cartilage.	Study on Connective Tissue and Cartilage Types
Week 9	**Muscles**: Structure and function of skeletal, smooth, and cardiac muscles.	Write a report on Types of Muscles and Their Functions
	Skeletal Muscle as Contractile Machinery: Sliding filament model of contraction.	Assignment: Sliding Filament Theory of Muscle Contraction
Week 10	**Origin, Insertion, and Types of Muscle Movements**: Understanding muscle action, synergists, antagonists, prime movers.	Case study on Muscle Movement and Function
	The Genito-Urinary System: Structures and organs of the urinary system, nephron structure, urine formation.	Read on Structure of the Urinary System and the Nephron
Week 11	**Urine Regulation**: Process of urine formation, regulation of urine concentration.	Research paper on Urine Formation and Regulation
	Formation of Sex Cells: Ovulation and spermatogenesis, reproductive system anatomy.	Assignment: Ovulation and Spermatogenesis Process
Week 12	**Male Reproductive System**: Structure and function of male reproductive organs.	Study guide on Male Reproductive Anatomy
	Female Reproductive System: Structure and function of female reproductive organs.	Write a report on Anatomy and Function of the Female Reproductive System
Week 13	**The Digestive System**: Structure of the digestive organs and their relationships with other organs.	Complete reading on Digestive System Anatomy and Its Functions
	Types of Digestion and Digestive Processes: Mechanical and chemical digestion.	Study: Types of Digestion and Digestive Processes
Week 14	**Secretory Glands in Digestion**: Liver, pancreas, and their exocrine and endocrine functions.	Research on The Role of Liver and Pancreas in Digestion
	Respiratory System: Anatomy of respiratory passages from nose to alveoli.	Diagram on Respiratory Passage Structure
Week 15	**Vocal Cords and Larynx**: Function of vocal cords, larynx, and voice production.	Write a report on The Role of the Larynx in Voice Production
	Respiratory and Conducting Zones: Different zones in the respiratory system.	Assignment on Respiratory Zones and Their Functions
Week 16	**The Nervous System**: Division of the nervous system, CNS, PNS, and autonomic nervous system.	Case study on Central and Peripheral Nervous System
	Special Senses: Olfactory system, hearing and balance, taste, vision, and touch.	Final exam review on Special Senses and Nervous System Pathways
Course Content (Lab)		**Assignments/Readings**
Week 1	**Labelling of Various Planes, Sections & Regions of the Human Body**: Identification and labelling exercises.	Read Chapter on Planes, Sections, and Regions of the Human Body
Week 2	**Skeletal System of the Human Body**: Study of human skeleton, labelling bones and understanding bone structure.	Review skeletal system and complete labelling exercises.
Week 3	**Identification of Bones**: Identification of compact, spongy, long, short, and sesamoid bones.	Assignment: Classification of Bone Types

Week 4	**Identification of Various Types of Muscles**: Label and identify different muscle types: skeletal, smooth, and cardiac.	Study muscle types and complete muscle identification worksheets.
Week 5	**Identification of Various Organs of the Gastrointestinal System**: Label and identify organs of digestion.	Read on Anatomy of the Gastrointestinal System
Week 6	**Labelling of Anatomical and Functional Regions of the Nervous System**: Identification of brain regions and spinal cord.	Review the nervous system anatomy and complete labelling exercises on brain regions and functional areas.
Week 7	**Drawing and Labelling of Structures of the Genito-Urinary Tract System**: Study of male and female reproductive organs and urinary tract.	Complete diagram labelling on Genito-Urinary System
Week 8	**Differentiation Between Arteries, Veins, and Capillaries**: Visual identification and functional differentiation.	Read on Difference Between Arteries, Veins, and Capillaries
Week 9	**Demonstration of Structures on Models**: Explore anatomical models of human systems (skeletal, muscular, etc.)	Practical workbook on Exploring Body Models
Week 10	**Demonstration of Specimens**: Examination of preserved anatomical specimens to understand real human anatomy.	Assignment: Analysis of Specimen Structures
Week 11	**Spottings**: Identifying and labelling anatomical structures on prepared slides or models.	Review spotting guide for human anatomy structures.
Week 12	**Histology Slides**: Study of tissue slides to identify types of tissues in various organs.	Read on Histology and Tissue Identification
Week 13	**X-Ray Identification**: Interpretation and identification of anatomical structures from X-ray images.	Assignment: Identifying Bones and Joints from X-rays
Week 14	**Demonstration of Joint Movements**: Observation and analysis of joint movements on models or volunteers.	Write a report on Types of Joint Movements and Their Functions
Week 15	**Practical on Muscular Contractions**: Hands-on demonstration of muscle contractions and types of movements.	Study on Muscle Contraction Mechanism and Types
Week 16	**Final Practical Review**: Comprehensive review of all anatomical structures covered through models, specimens, and slides.	Final practical exam review: Comprehensive Study of Human Anatomy

Textbooks and Reading Material

- Singh, V. (2022). *General Anatomy- with Systemic Anatomy, Radiological Anatomy, Medical Genetics - E-book.* Elsevier Health Sciences.
- Drake, R. L., Vogl, A. W., & Mitchell, A. W. (2022). *Gray's Basic Anatomy - E-book.* Elsevier Health Sciences.
- Kay, S., Wilks, D., & McCombe, D. (2020). *Oxford Textbook of Plastic and Reconstructive Surgery and Anatomy.* Oxford University Press.
- Spratt, J. D., Salkowski, L. R., Loukas, M., Weir, J., Turmezei, T., & Abrahams, P. H. (2020). *Weir & Abrahams' Imaging Atlas of Human Anatomy.* Elsevier.
- Siddiqui, L. (2019). *General Anatomy.*
- Garg, K. (2019). *BD Chaurasia's Handbook of General Anatomy.* CBS Publishers & Distributors Pvt, India.
- Snell, R. S. (2018). *Snell's Clinical Anatomy.* Wolters Kluwer India Pvt.

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Programme	Optometry & Vision Sciences	Course Code	OVS-103	Credit Hours	3(2+1)
Course Title	Physiology				

Course Introduction

The **Physiology** course provides an understanding of the human body's functions and processes, focusing on the mechanisms that maintain homeostasis. It covers key systems such as cardiovascular, respiratory, musculoskeletal, and nervous systems, emphasizing the relationship between structure and function. The course includes practical sessions to measure vital parameters like blood pressure, pulse rate, ECG, and others, allowing students to apply theoretical concepts. Designed for students in allied health sciences, this course equips learners with essential knowledge and hands-on skills, preparing them for careers in healthcare and medical fields by exploring normal physiological processes and disease-related changes.

Learning Outcomes

On the completion of the course, the students will:

- Understand the fundamental physiological processes that maintain homeostasis in the human body.
- Explain the structure-function relationship in major organ systems like the cardiovascular, respiratory, digestive, and musculoskeletal systems.
- Demonstrate the ability to measure and interpret physiological parameters such as blood pressure, pulse rate, ECG, and others.
- Identify normal and abnormal physiological processes in various body systems.
- Apply knowledge of human physiology to healthcare, clinical diagnostics, and treatment approaches.
- Develop practical skills through laboratory experiments and real-world physiological measurements.
- Critically analyze physiological data and apply it to health and disease scenarios.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Human Physiology: Functional organization—structure and function relationship; Homeostasis, feedback mechanisms (negative & positive)	Read chapters on Homeostasis and Functional Organization from textbook.
	Integumentary System: Functions of skin, hair, glands, and nails; Body temperature regulation	Study the structure and functions of the skin, hair, and glands.
Week 2	Musculoskeletal System: Functions of bones and muscles; Characteristics of skeletal, smooth, and cardiac muscle	Review muscle types and their functions; muscle contraction mechanisms.
	Muscle Contraction: Muscle contraction & relaxation in response to action potentials; Aerobic vs anaerobic contraction	Read on muscle physiology and contraction types.
Week 3	Muscle Hypertrophy and Atrophy	Study muscle hypertrophy and atrophy mechanisms and factors.
	Blood: Composition of blood and plasma, functions, formed elements, stages of cell development	Review blood components, formation, and functions.
Week 4	Blood Grouping and Coagulation Mechanism	Study blood grouping and coagulation pathways.
	The Cardiovascular System: Functions of the heart; Electrical activity of the heart, origin of cardiac impulse	Review the heart's electrical activity and phases of the cardiac cycle.
Week 5	Phases of the Cardiac Cycle; Heart Sounds; Regulation of Heart Functions (Intrinsic & Extrinsic)	Study the cardiac cycle, heart sounds, and heart function regulation.
	Functions of Peripheral Circulation; Physiology of Circulation	Understand systemic and pulmonary circulation.
Week 6	Nervous Control of Blood Vessels; Regulation of Arterial Pressure	Read on the autonomic nervous system's role in vascular regulation.

	The Lymphatic System: Functions of tonsils, lymph nodes, spleen, thymus	Study the lymphatic system and immune response.
Week 7	Immunity: Innate vs Adaptive immunity, antigens and antibodies, primary and secondary immune responses	Review immunity types, lymphocyte function, and immune responses.
	The Specialized Sense Organs: Eye—Physiology of sight, accommodation, optic nerve, and chiasma	Study the physiology of vision and related neural pathways.
Week 8	Ear—Functions of the inner, middle, and outer ear; Physiology of hearing and balance	Review ear structure and function, hearing, and balance mechanisms.
	Smell—Physiology of the Olfactory Nerve; Taste—Physiology of taste and speech	Study the physiology of smell, taste, and speech processes.
Week 9	Nervous System: Functions of the CNS, functional areas of the cerebral cortex	Review the organization and functions of the central nervous system.
	Brainstem, Diencephalon, Basal Nuclei, Limbic System, Cerebellum Functions	Study the parts of the brainstem and their roles in motor control.
Week 10	Functions of Cranial Nerves; Somatic Motor Nervous System and Autonomic Nervous System	Review cranial nerve functions and somatic vs autonomic nervous systems.
	Neurons, Neuroglial Cells, and Components; Resting Membrane Potential, Action Potential	Study neuronal function, synapses, and neuroglial roles.
Week 11	Synapse and Reflex Arc Function	Understand reflex arc pathways and neural transmission.
	Respiratory System: Functions, ventilation, lung volumes, gas exchange, rhythmic ventilation	Review respiratory mechanics and gas exchange in alveoli.
Week 12	Digestive System: Functions of digestive organs, salivary glands, and regulation of movements and secretions	Study the digestive process, from mouth to absorption in intestines.
	Physiology of Digestion, Absorption, and Transportation of Nutrients	Study the absorption and transportation of nutrients within the body.
Week 13	Genito-Urinary System: Urine production, movement, and regulation of urine concentration and volume	Review kidney function, fluid balance, and urine production.
	Body Fluid Compartments; Regulation of Extracellular Fluid Composition	Study fluid compartments and how the body regulates fluid balance.
Week 14	Regulation of Acid-Base Balance	Review how the body maintains pH balance through buffers and systems.
	Male Reproductive System: Spermatogenesis, reproductive glands, hormones, and regulation	Study the physiology of male reproductive system and hormonal regulation.
Week 15	Female Reproductive System: Ovulation, hormonal regulation	Review the female reproductive cycle, ovulation, and related hormones.
	Endocrine System: Hormones and their regulation	Study the function of hormones and their effects on bodily functions.
Week 16	Review of Human Physiology: Integration of organ systems and homeostasis	Study the overall integration of systems and regulation of homeostasis.
	Final Review and Discussion of Key Concepts	Prepare for final exam, review key concepts and physiological processes.

Course Content (Lab)		Assignments/Readings
Week 1	Determination of Human Pulse Rate	Read about pulse rate measurement techniques and factors influencing pulse.
Week 2	Determination of Blood Pressure (Auscultatory and Palpatory Methods)	Study the principles of blood pressure measurement and interpretation.
Week 3	The Effect of Exercise and Posture on Blood Pressure	Review the physiological effects of exercise and posture on blood pressure.
Week 4	Determination of Visual Acuity for Distant Vision	Study the anatomy of the eye and factors affecting visual acuity.
Week 5	Determination of Visual Acuity for Near Vision	Read on near vision assessment and common vision disorders.
Week 6	Study of Hemocytometer	Review the principles of using a hemocytometer for blood cell counting.
Week 7	Count the Total Number of RBCs/mm^3 of Your Own Blood	Study RBC counting techniques and normal ranges for blood cell counts.
Week 8	Examination of Cranial Nerves	Study the functions and assessments of cranial nerves.
Week 9	Use of the Microscope	Review microscope types, parts, and proper usage techniques.
Week 10	Blood Pressure Measurement	Study blood pressure measurement devices and techniques.
Week 11	Membrane Permeability Test	Review the concept of membrane permeability and factors affecting it.
Week 12	Phlebotomy: Techniques and Procedures	Study phlebotomy techniques and safety protocols.
Week 13	Measuring Bleeding Time (BT) and Clotting Time (CT)	Read about the physiological basis of BT and CT and their significance.
Week 14	Electrocardiogram (ECG)	Study ECG principles, electrode placement, and interpretation of waves.
Week 15	Prothrombin Time (PT) Measurement	Review the concept and clinical significance of Prothrombin Time testing.
Week 16	Activated Partial Thromboplastin Time (aPTT) Measurement	Study the role of aPTT in coagulation testing and its clinical applications.

Textbooks and Reading Material

- **Essentials of Anatomy and Physiology** (4th Edition), Authors: Valerie C. Seeley, Stephen W. Stephens, Philip Tate, Publisher: W.B. Saunders Company
- **Guyton and Hall Textbook of Medical Physiology** (14th Edition), Authors: John E. Hall, Arthur C. Guyton, Publisher: Elsevier
- **Human Physiology: An Integrated Approach** (9th Edition), Author: Dee Unglaub Silverthorn, Publisher: Pearson
- **Principles of Physiology** (7th Edition), Author: Michael L. Johnson Publisher: Elsevier
- **Boron & Boulpaep's Medical Physiology** (3rd Edition), Authors: Walter F. Boron, Emile L. Boulpaep, Publisher: Elsevier

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Programme	Optometry & Vision Sciences	Course Code	OVS-104	Credit Hours	2 (2+0)
Course Title	Behavioral Sciences				

Course Introduction

Behavioural sciences in medicine explore the intersection between human behaviour and health, focusing on how psychological, social, and cultural factors influence well-being and illness. This field encompasses psychology, sociology, and psychiatry, aiming to understand patient behaviour, mental health, and the social determinants of health. By applying behavioural science principles, healthcare providers can improve patient care, enhance communication, and address mental health issues alongside physical conditions. Understanding these aspects allows for more effective treatment strategies, improved patient adherence, and the promotion of healthier lifestyles, ultimately leading to better health outcomes and a more holistic approach to medical practice.

Learning Outcomes

On the completion of the course, the students will:

- Identify and explain the impact of cultural and community contexts on health behaviours, beliefs, and outcomes, and demonstrate how physicians can effectively integrate this understanding into patient care.
- Gather a comprehensive and accurate patient history that fosters a therapeutic relationship, demonstrating self-awareness and reflective practice in the process.
- Use shared decision-making principles to clearly explain a patient's medical condition and treatment options, considering the patient's background, education, and belief systems.
- Provide patient-centered behavioural guidance, articulating the relevant theoretical model that underpins the chosen approach.
- Recognize the influence of social determinants of health on patient outcomes and integrate this knowledge into clinical decision-making and patient care.
- Acknowledge and report personal errors, analyze their potential causes, and develop a plan to minimize future risks.

Course Content (Theory)		Assignments/Readings
Week 1	**Introduction to Behavioral Sciences and its Importance in Health**: Overview of behavioral sciences and health care models	Introduction to Behavioral Sciences
	Bio-Psycho-Social Model of Health Care and the Systems Approach: Integration of biological, psychological, and social factors	Review article on the Bio-Psycho-Social model in health care systems
Week 2	**Normality Vs Abnormality**: Understanding the concepts of normal vs abnormal behavior in health contexts	Case study: Identify signs of normal and abnormal behaviors in medical practice
	Professionalism and Desirable Attitudes in Health Professionals: Ethical standards, communication, and empathy	Professionalism in Health Care
Week 3	**Life Cycle - Behavioral Aspects of Development through the Life Cycle**: Infancy and childhood behavior	Assignment: Behavioral development in infancy and childhood
	Life Cycle - Behavioral Aspects of Development: Adolescence and adulthood	Case study: Behavioral characteristics of adolescence and adulthood
Week 4	**Death and Dying and Bereavement**: Psychological aspects of death and grieving	Read article on Psychological Stages of Dying and prepare for class discussion
	Death and Dying: Coping with death, dying, and bereavement	Case discussion on coping mechanisms during bereavement

Week 5	**Biological Basis of Behavior**: Psychodynamic factors - Learning, Memory, and Thinking	Prepare summary of different learning theories and their application in health
	Psychological Basis of Behavior: Motivation, Personality, Intelligence, Emotions, and Stress	Assignment: Identify how stress impacts learning and memory in health professionals
Week 6	**Social Basis of Behavior**: Sociological aspects of health and illness (Social Class, Gender, Health Belief Model)	Read sociological perspectives on health beliefs and class differences in healthcare
	Social and Anthropological Basis of Behavior: Stigma, Sick Role, Ethnicity, and Groups	Group discussion: Impact of stigma and ethnicity on patient care
Week 7	**Anthropological Aspects of Health**: Cultural sensitivity in health assessment	Prepare for discussion on cultural differences in health assessment and healthcare delivery
	Health Disparity and Health Inequality: Exploring the gap in healthcare access and outcomes	Read article on health inequalities and prepare a reflection on its societal impact
Week 8	**Illness and Healthcare Professional Relationship**: Medical Communication	Role play: Doctor-patient communication skills and medical interview
	Non-Pharmacological Interventions: Counseling, therapies, and alternative approaches	Study the use of non-pharmacological interventions in clinical practice
Week 9	**Breaking Bad News**: Techniques and psychological reactions	Assignment: Write a reflection on techniques for delivering bad news in a healthcare setting
	Crisis Intervention: Approaches to managing medical crises and acute reactions	Read Chapter on Crisis Intervention in Healthcare
Week 10	**Coping with Disability**: Stress, anxiety, and self-help groups for disabled individuals	Prepare for class discussion on psychological reactions to disability
	Pain Management and Psychosocial Aspects of Disability: Understanding pain in a psychological context	Assignment: Analyze case studies involving psychosocial aspects of pain management
Week 11	**Doctor-Patient Relationship**: Psychological reactions in doctor-patient interactions	Role play: Exploring different models of doctor-patient relationships
	Treatment Adherence: Understanding the factors influencing patient adherence to treatment	Read and summarize article on treatment adherence and patient behavior
Week 12	**Psychological Reactions to Illness**: Emotional and psychological impacts of illness	Prepare a case study on psychological reactions to chronic illness
	Psychosocial Aspects of Disease and Illness: Impact on social life and mental health	Study the effects of chronic diseases on patients' psychosocial well-being
Week 13	**Psychosocial Aspects of Intellectual Disability**: Behavioral, emotional, and social factors	Assignment: Case study of intellectual disability in healthcare settings
	Mental Health and Behavioral Factors in Disease: Exploring mental health challenges in disease diagnosis	Discuss mental health aspects of chronic disease treatment and management
Week 14	**Models of Doctor-Patient Relationship**: Exploring different therapeutic approaches	Case discussion on models of doctor-patient relationships and treatment adherence

	Psychosocial Interventions: Non-medical approaches to treating illness	Prepare presentation on psychosocial interventions in chronic diseases
Week 15	**Psycho-trauma and PTSD**: Understanding trauma, stress responses, and PTSD in healthcare	Prepare a reflective essay on coping with PTSD in healthcare settings
	Psychological Reactions to Trauma: Medical trauma and the need for specialized care	Group discussion on psychological management of trauma and crisis situations in healthcare
Week 16	**Integration of Behavioral Science in Health Care**: Summary and review of psychosocial aspects of healthcare	Review all key concepts discussed in previous weeks
	Final Exam: Review and application of behavioral science in health	Final Exam covering course content

Textbooks and Reading Material

- Behavioral Science in Medicine, 2nd Ed. by Barbara Fadem (2012).
- Handbook of Behavioral Sciences, 3rd Ed. by M.H. Rana (2012).
- Integrating Behavioral Sciences in Healthcare, 2nd Ed. by Asma Humayun and Michel Herber (2011).
- Psychology and Sociology Applied to Medicine: An Illustrated Color Text, 3rd Ed. by Beth Alder (2004).

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Programme	Optometry & Vision Sciences	Course Code	OVS-105	Credit Hours	2 (2+0)
Course Title	Medical Sociology				

Course Introduction

Medical Sociology explores the relationship between society and health. This course introduces students to the ways in which social, cultural, and economic factors influence the experience of health and illness. It covers the impact of societal structures and social roles on healthcare delivery, illness perceptions, and the behaviour of healthcare professionals and patients. By studying these sociological aspects, students will gain a deeper understanding of how health is shaped by social forces and how health disparities emerge and persist.

Learning Outcomes

On the completion of the course, the students will:

- Understand the role of social factors in shaping health and illness.
- Analyze the influence of social institutions (e.g., family, education, healthcare systems) on individual and collective health.
- Examine health disparities, focusing on race, gender, class, and other social determinants.
- Learn about the social construction of illness and how cultural perceptions influence the experience of illness.
- Develop an understanding of the sociological aspects of healthcare delivery and professional practice.

	Course Content (Theory)	Assignments/Readings
Week 1	**Evolution of Health and Healing**: Historical Development of Medical Practices and Knowledge	Historical Evolution of Health Practices
	Evolution of Healthcare Systems and Treatment Modalities: Overview of healthcare systems and their evolution	Article: The Development of Healthcare Systems Across Time
Week 2	**Body, Mind, Illness, and Environment**: Impact of Environmental Factors on Health and Disease	Read article on Environmental Influences on Health
	Interconnection between Physical and Mental Health: Understanding the mind-body connection in health and illness	Case study on mind-body interactions in chronic illness
Week 3	**Theories of Medical Sociology**: Overview of Medical Sociology Theories	Theories in Medical Sociology
	Research Methods in Medical Sociology: Qualitative and quantitative research approaches	Prepare summary of different research methodologies in medical sociology
Week 4	**Current Debates and Controversies in Medical Sociology**: Contemporary discussions in the field	Research paper on a current debate in medical sociology (e.g., Medicalization, health disparities)
	Overview of the Social Construction of Health and Illness: Exploring the social context of health perceptions	Read article: Social Construction of Illness and Health
Week 5	**Social, Environmental, and Occupational Factors in Health and Illness**: Impact of Socioeconomic Status on Health	Socioeconomic Status and Health
	Impact of Environment and Living Conditions on Health: Exploring environmental health risks	Assignment on Environmental Health and Policy
Week 6	**Occupational Hazards and Health Implications**: The impact of work-related factors on health	Case study on occupational health risks (e.g., exposure to chemicals, stress in healthcare professions)
	The Meaning of Health and Illness from the Patient's Perspective: Subjective experience of health and illness	Reflection paper on personal perceptions of illness from a patient's viewpoint
Week 7	**Cultural and Social Influences on Perception of Health and Illness**: How culture shapes the view of illness	Read on cultural differences in illness perception

	Patient Empowerment and Decision-Making in Healthcare: The role of patient choice in treatment decisions	Group discussion on Patient Empowerment in Medical Decision-Making
Week 8	**Historical Transformation of Health Professions**: Evolution of Healthcare Professions and Roles	Research paper on the history of medical professions and their evolving roles in healthcare
	Changes in Healthcare Delivery Systems: Shifts in healthcare systems and the role of professionals	Case study on the evolution of healthcare delivery in developed countries
Week 9	**Impact of Technological Advancements on Healthcare Professions**: Technology's effect on healthcare roles	Assignment on the impact of telemedicine and AI in healthcare professions
	Social and Cultural Factors Surrounding the Creation and Labeling of Diseases: Social construction of diseases	Read article: Social Construction of Disease and Illness
Week 10	**Cultural Interpretations and Stigmatization of Diseases**: Exploring cultural responses to disease and illness	Group project on cultural interpretations of mental illness and its stigma
	Medicalization and Pathologization of Behavior: Examining the medicalization of everyday behaviors	Article review on Medicalization of Society
Week 11	**Disparities in Health, Access to Healthcare, and the Healthcare Received**: Socioeconomic Disparities in Health	Health Disparities in Society
	Access Barriers to Healthcare Services: Exploring obstacles to healthcare access	Research paper: Barriers to Healthcare Access in Low-Income Communities
Week 12	**Quality Discrepancies in Healthcare Provision**: Addressing inequalities in healthcare quality	Case study on healthcare quality issues (e.g., in underserved communities)
	Organizational and Ethical Issues in Medicine: Rising costs and healthcare reforms	Assignment on Ethical Dilemmas in Healthcare Reforms
Week 13	**Rising Healthcare Costs and Technology**: The economic challenges in modern healthcare systems	Read article on the economics of healthcare and technology
	Healthcare Reforms and Ethical Considerations: The role of ethics in healthcare reform	Debate: Should healthcare be a universal right?
Week 14	**Patient Rights, Consent, and Ethical Dilemmas in Medicine**: Addressing patient rights in the medical field	Case study on Patient Consent in Medical Procedures
	Ethical Issues in Healthcare Technology: The role of technology in ethical decision-making in healthcare	Review of ethical issues arising from new medical technologies (e.g., AI, gene editing)
Week 15	**Contemporary Issues in Medical Sociology**: Integration of theory, research, and social practices in healthcare	Prepare presentation on the integration of sociological theories in current medical practices
	Future Directions in Medical Sociology: Discussing emerging trends and future challenges in the field	Group discussion: The future of healthcare in a sociological context
Week 16	**Review of Key Concepts in Medical Sociology**: Recap of the course material and essential takeaways	Review key concepts and prepare for final exam
	Final Exam: Comprehensive exam covering all topics discussed throughout the course	Final Exam

Textbooks and Reading Material

- The Sociology of Health and Illness Critical Perspectives,11th Edition byPeter Conrad, Valerie Leiter Published: June 2023
- Medical Sociology by William Cockerham, 15th Edition. B/W IllustrationsPublished September 30, 2021, by Routledge.

- A Sociology of Health by David Wainwright, 2008
- The Sociology of Health, Illness, and Health Care: A Critical Approach, 7th Edition by Rose Weitz, 2016.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%.
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-106	Credit Hours	3(2+1)
Course Title	General Pathology				

Course Introduction

The **General Pathology** course provides an in-depth study of the fundamental principles behind disease processes in the human body. It focuses on how cellular and molecular abnormalities contribute to structural and functional changes that lead to various diseases. By integrating theoretical lectures, laboratory demonstrations, and case studies, students will develop a thorough understanding of the mechanisms involved in the development, progression, and outcomes of diseases. This course serves as a foundational component in understanding pathological processes, preparing students for further study in medical and health-related fields.

Learning Outcomes

On the completion of the course, the students will:

- Understand the fundamental principles and mechanisms of disease processes.
- Recognize the role of cellular and molecular abnormalities in disease development.
- Analyze the structural and functional changes that occur in various diseases.
- Identify the causes and risk factors associated with different pathological conditions.
- Apply knowledge of disease mechanisms to understand the progression and outcomes of various health conditions.
- Evaluate case studies to develop clinical reasoning skills in the context of pathology.
- Demonstrate proficiency in laboratory techniques used to study pathological processes.
- Understand the impact of pathological changes on organ systems and overall health.
- Integrate pathological knowledge with clinical practice for improved patient care and diagnosis.

Course Content (Theory)		Assignments/Readings
Week 1	Cellular Adaptation: Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Aplasia	Review chapters on cellular adaptation from the textbook.
	Cellular Adaptation: Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Aplasia	Case study discussion on pathological cellular changes.
Week 2	Cell Injury and Adaptation: Cell Injury (Reversible and Irreversible)	Read about types of cell injury in pathology textbook.
	Fatty Change, Pigmentation, Pathologic Calcification	Study the mechanisms of fatty change and calcification.
Week 3	Necrosis and Gangrene	Assignment on types of necrosis with case examples.
	Inflammation: Acute Inflammation Overview	Review acute inflammation in pathological processes.
Week 4	Inflammation: Vascular Changes	Read on the vascular changes during inflammation.
	Inflammation: Chemotaxis and Opsonization	Prepare a detailed report on chemotaxis and opsonization.
Week 5	Inflammation: Phagocytosis	Study the role of phagocytosis in inflammation.
	Inflammation: Cellular Components and Chemical Mediators	Quiz on chemical mediators and cellular components in inflammation.
Week 6	Inflammation: Exudates vs. Transudate	Read on the differences between exudates and transudates.
	Chronic Inflammation: Etiological Factors	Research on the causes of chronic inflammation.
Week 7	Chronic Inflammation: Granuloma Formation	Case study on granulomas and their formation.

	Chronic Inflammation: Granuloma	Assignment on chronic inflammation and granuloma pathology.
Week 8	Cell Repair and Wound Healing	Read about the process of cell repair in wound healing.
	Regeneration and Repair	Discuss the regenerative vs. repair processes.
Week 9	Healing: First Intention	Assignment on wound healing by first intention.
	Healing: Second Intention	Study the process of wound healing by second intention.
Week 10	Factors Affecting Healing	Review factors affecting healing such as infection, nutrition, and circulation.
	Complications of Wound Healing	Case study on complications like infection, dehiscence, etc.
Week 11	Hemodynamic Disorders: Edema, Hemorrhage	Reading on hemodynamic disorders in pathology.
	Hemodynamic Disorders: Thrombosis, Embolism, Infarction & Hyperemia	Review thrombosis, embolism, infarction and hyperemia.
Week 12	Shock: Definition and Classification	Research on the classification and causes of shock.
	Shock: Compensatory Mechanisms	Discuss compensatory mechanisms involved in shock.
Week 13	Consequences of Thrombosis	Assignment on the clinical consequences of thrombosis.
	Arterial vs. Venous Embolism	Study the differences between arterial and venous emboli.
Week 14	Neoplasia: Dysplasia and Neoplasia	Read on dysplasia and neoplasia, with examples.
	Benign vs. Malignant Neoplasms	Compare benign and malignant neoplasms in terms of growth patterns.
Week 15	Etiological Factors of Neoplasia	Research on common causes of neoplasia, including environmental and genetic factors.
	Metastasis: Modes of Metastasis	Study the different modes of metastasis.
Week 16	Review of General Pathology: Cellular Injury and Adaptation	Group discussion or presentation on case studies of cellular injury.
	Review of General Pathology: Inflammation, Healing, Shock, Neoplasia	Final assignment or exam covering all topics studied.
Course Content (Lab)		
Week 1	**Microscopy Techniques**: Introduction to various types of microscopes, proper usage, and maintenance.	Study basic principles of microscopy and microscope handling.
Week 2	**Routine Staining (H&E)**: Techniques of Hematoxylin and Eosin (H&E) staining for tissue analysis.	Review the H&E staining procedure and its application.
Week 3	**Identification of Inflammatory Cells**: Study of neutrophils, macrophages, lymphocytes, eosinophils, and basophils.	Read on types and functions of inflammatory cells.
Week 4	**Acute Inflammation**: Observation and demonstration of acute inflammatory response, including cellular changes.	Review the mechanisms and cellular events in acute inflammation.

Week 5	**Chronic Inflammation**: Demonstration of chronic inflammation and granulomatous reactions in tissue samples.	Study the pathophysiology of chronic inflammation.
Week 6	**Intracellular Accumulations**: Study of fatty change in liver, melanin pigmentation, and brown atrophy in heart tissue.	Review the causes and types of intracellular accumulations.
Week 7	**Amyloidosis**: Identification of amyloid deposits in tissues like kidney, spleen, and liver.	Study amyloidosis, its causes, and histological features.
Week 8	**Lung Abscess Formation**: Histopathological study of abscess formation in lung tissues.	Read about the formation and diagnosis of lung abscesses.
Week 9	**Granulation Tissue in Chronic Inflammation**: Study of granulation tissue in healing chronic inflammatory lesions.	Review the characteristics of chronic inflammation and healing.
Week 10	**Tuberculous Lymphadenitis**: Examination of tuberculous lesions in lymph nodes, focusing on histological changes.	Study tuberculosis and its effects on lymph nodes.
Week 11	**Necrosis and Its Types**: Study of coagulative, liquefactive, caseous, and fat necrosis with examples from various organs.	Review the different types of necrosis and their causes.
Week 12	**Coagulative Necrosis**: Focused study of coagulative necrosis in organs such as the heart and kidneys.	Study coagulative necrosis, its features, and causes.
Week 13	**Histopathological Techniques**: Introduction to tissue fixation, embedding, sectioning, and staining methods.	Review histological processing techniques.
Week 14	**Study of Inflammation**: Practical demonstration of acute and chronic inflammation in tissue slides.	Study the stages and types of inflammation in tissues.
Week 15	**Comparing Acute and Chronic Inflammation**: Comparative analysis of acute vs chronic inflammation in various organs.	Review key differences between acute and chronic inflammation.
Week 16	**Final Practical Exam and Review**: Assessment of the ability to identify and describe pathological changes in slides.	Review all course content and prepare for the final exam.

Textbooks and Reading Material

- Jain, P. K., Singh, Y. N., Gollapalli, R. P., & Singh, S. P. (2022). Advances in Signal Processing and Communication Engineering: Select Proceedings of ICASPACE 2021. Springer Nature.
- Kumar, V., Abbas, A. K., Aster, J., & Deyrup, A. T. (2020). Robbins Essential Pathology (E-book). Elsevier Health Sciences.
- Agarwal, A., Jeyarajah, S., McLatchie, G., Borley, N., Harries, R., & Weerakkody, R. (2022). Oxford Handbook of Clinical Surgery. Oxford University Press.
- Goljan, E. F. (2019). Rapid Review Pathology: Second South Asia Edition.Cai, G., & Adeniran, A. J. (2019). Rapid On-Site Evaluation (ROSE): A Practical Guide. Springer Nature.
- Mitchell, R. N., Kumar, V., Fausto, N., Abbas, A. K., & Aster, J. C. (2016). Pocket Companion to Robbins & Cotran Pathologic Basis of Disease (E-book). Elsevier Health Sciences.
- Majno, G., & Joris, I. (2018). Cells, Tissues, and Disease. Wiley-Blackwell.

Teaching Learning Strategies

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2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.

4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-107	Credit Hours	3(2+1)
Course Title	Eye Anatomy				

Course Introduction

This course is designed to provide a comprehensive understanding of the anatomy of the eye, which is fundamental for students pursuing a career in Optometry and Vision Sciences. It covers the structure, function, and physiology of the various components of the eye, including the external and internal parts, and explores how these elements contribute to vision and overall ocular health. The course will lay the groundwork for more advanced topics in Optometry, such as visual perception, refractive errors, and eye diseases.

Learning Outcomes

On the completion of the course, the students will:

- Identify and describe the anatomical components of the eye and their functions.
- Understand the mechanism of vision, including how light is processed and transmitted through the eye.
- Recognize common ocular diseases and disorders and their impact on vision.
- Apply anatomical knowledge to clinical situations and visual problem assessments.
- Explain ocular motility and the role of extraocular muscles in eye movement.

	Course Content (Theory)	Assignments/Readings
Week 1	The orbit: a. Salient structural features i.e; its position, shape, margins & walls	Read on Orbit Anatomy; Assignment on orbital structure.
	The orbit: b. Important relations of the orbit	Read relevant sections on orbital relations; Case study analysis.
Week 2	The orbit: c. Important openings of the orbit	Assignment on orbital openings; Review images of orbital anatomy.
	The orbit: d. Contents of the orbit	Prepare notes on orbital contents; Practical discussion.
Week 3	The orbit: e. The paranasal sinuses & their clinical significance	Read on paranasal sinuses; Clinical case study on sinus-related issues.
	The orbit: f. Normal structure of the eyelids	Read article on eyelid anatomy; Assignment on eyelid structure.
Week 4	The orbit: g. The lacrimal apparatus- structure	Assignment on lacrimal apparatus; Review of lacrimal disorders.
	The eyeball: a. Introduction and dimensions	Read on eyeball dimensions; Study questions on eye size.
Week 5	The eyeball: b. Factors responsible for the stability of the eyeball in the orbit	Prepare notes on eyeball stability factors; Case study on stability.
	The eyeball: c. Coverings of the eyeball	Read section on eyeball coverings; Assignment on ocular layers.
Week 6	The eyeball: d. Conjunctiva	Assignment on conjunctiva anatomy; Case study on conjunctival diseases.
	The eyeball: e. Blood supply of the eyeball	Review blood supply diagrams; Write assignment on ocular blood circulation.
Week 7	The eyeball: f. Lymphatic drainage of the orbit & the ocular adnexa	Read on lymphatic drainage of the orbit; Assignment on ocular lymphatics.
	The eyeball: g. Nerves of the eye & the orbit	Assignment on cranial nerves in the eye; Case study on nerve involvement in vision.

Week 8	Fibrous layer of the eyeball: a. Basic structure of the cornea	Read on corneal anatomy; Assignment on corneal diseases.
	Fibrous layer of the eyeball: b. Structure of the sclera	Study scleral structure; Assignment on scleral functions.
Week 9	Fibrous layer of the eyeball: c. Limbus and the important structures related to it	Assignment on limbus anatomy; Review related ocular structures.
	Vascular layer of the eyeball: a. Anatomy of the uveal tract	Study uveal tract components; Write an assignment on uveal diseases.
Week 10	The lens and chambers of the eye: a. Structure of the lens and its capsule	Read on the lens; Assignment on lens disorders.
	The lens and chambers of the eye: b. Chambers of the eye	Assignment on anterior & posterior chambers; Case study on chamber issues.
Week 11	Retina and the vitreous: a. The layered structure of retina	Read on retinal layers; Assignment on retinal diseases.
	Retina and the vitreous: b. Important elements in retinal image capturing like the photoreceptors, bipolar & ganglion cells	Prepare notes on retinal cells; Review retinal imaging.
Week 12	Retina and the vitreous: c. Structure of the retina as seen by an ophthalmoscope	Assignment on ophthalmoscope use; Case study on retinal examination.
	Neuro-ophthalmology and the pupil: a. The optic nerve	Read on optic nerve structure; Assignment on optic nerve disorders.
Week 13	Neuro-ophthalmology and the pupil: b. The visual pathway	Study visual pathway diagrams; Assignment on visual processing.
	Neuro-ophthalmology and the pupil: c. Outline of neural pathway for the pupillary reflex	Read on pupillary reflex; Assignment on neural pathways.
Week 14	Neuro-ophthalmology and the pupil: d. The 3rd, 4th & 6th Cranial nerves	Review cranial nerve functions; Case study on pupillary reflex.
	Neuro-ophthalmology and the pupil: e. 5th & the 7th cranial nerves	Assignment on cranial nerve involvement in eye function.
Week 15	Anatomy of Extraocular muscles: a. Anatomy of the extraocular muscles; name, origin & insertion, innervation	Read on extraocular muscles; Assignment on muscle functions.
	Anatomy of Extraocular muscles: b. Extraocular muscle clinical relevance	Prepare case study on ocular motility disorders.
Week 16	Review and Summary of key topics	Prepare a comprehensive summary of the course; Review practical concepts.
	Final Exam Preparation	Review all chapters and practical applications; Prepare for the final exam.
Course Content (Lab)		
Week 1	The orbit: Structural features	Hands-on identification of orbital structures using models.
Week 2	The orbit: Relations and openings	Practical demonstration using anatomical diagrams/models.
Week 3	The orbit: Contents of the orbit	Identify orbital contents and structures using dissection models.
Week 4	The orbit: The paranasal sinuses & their significance	Examine paranasal sinuses through CT/MRI scans (if available).
Week 5	Eyelid anatomy	Practical assessment of eyelid structure using dissections/models.

Week 6	The lacrimal apparatus	Hands-on demonstration of lacrimal apparatus function.
Week 7	The eyeball: Dimensions	Measurement and assessment of eyeball size using ocular models.
Week 8	The eyeball: Stability factors	Hands-on observation of factors contributing to eyeball stability.
Week 9	The eyeball: Coverings of the eyeball	Dissection to identify and label ocular coverings.
Week 10	Conjunctiva anatomy	Practical exercises in identifying conjunctiva layers.
Week 11	Blood supply and lymphatics of the eyeball	Observe and identify blood supply and lymphatic pathways in ocular models.
Week 12	Nerve structures of the eye	Dissection and nerve pathway identification in the eye.
Week 13	Fibrous layer: Cornea & Sclera	Hands-on dissection and examination of cornea and sclera.
Week 14	Fibrous layer: Limbus	Examine limbal structures in cadaveric models.
Week 15	Extraocular muscles: Anatomy	Practical observation and palpation of extraocular muscles.
Week 16	Final Practical Exam	Final dissection and practical demonstration of all key ocular structures.

Textbooks and Reading Material

- Richard S Snell, Michael A Lemp. Clinical Anatomy of the eye: 1989 :Blackwell Scientific Publications.
- Brian Leather Barrow, Jane Fox. Care of the Ophthalmic Patient, a guide for nurses and health professionals, 2nd edition, 1996:Chapman & Hall.
- John P Perry, Andrew B Tullo (ed). Care of the Ophthalmic Patient A guide for nurses and health professionals, 2nd edition, 1996: Chapmann & Hall.
- John Sandford-Smith. Basic Anatomy and Physiology of eye. In Eye Diseases in Hot Climates, third edition, 1997: Butterworth – Heineman.
- Introduction to Anatomy, Physiology And Pharmacology 0f The Eye. Reference text by Allama Iqbal Open University, Pakistan.
- Lee Ann Remington. Clinical Anatomy of the Visual System.1998: Mosby.
- Frank W Newell. Ophthalmology Principles and concepts, 7th edition, 1999: Mosby.

Teaching Learning Strategies

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3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar			
1. Quiz-1 2. Quiz-II 3. Presentation 4. Professional Writing Assignments			
Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-108	Credit Hours	3(2+1)
Course Title	Eye Physiology				

Course Introduction

This course in **Eye Physiology** is designed to provide students with a comprehensive understanding of the physiological processes of the human eye, which are essential for Optometry and Vision Science students. It will cover the complex mechanisms that underpin vision, including the function of the eye's optical system, light processing, and neural pathways that allow the brain to interpret visual information. Emphasis will be placed on how the different components of the eye work together to enable clear vision and how disruptions in these processes can lead to vision disorders.

Learning Outcomes

On the completion of the course, the students will:

- Describe the physiological functions of the eye and its components in the process of vision.
- Explain the visual pathway from the retina to the brain, including the role of the optic nerve and visual cortex.
- Understand the structure and function of retinal cells, including photoreceptors, and their role in light adaptation and visual processing.
- Comprehend the process of photo transduction and how light is converted into neural signals in the retina.
- Analyze the mechanisms of eye movements, pupil reflexes, and accommodation to maintain clear and stable vision.

	Course Content (Theory)	Assignments/Readings
Week 1	The orbit: a. Functions of the eyelids	Read the function and structure of eyelids; Assignment on eyelid anatomy and physiology.
	The orbit: b. Functions of the lacrimal system	Study the lacrimal system; Write an assignment on its role in tear production and drainage.
Week 2	Fibrous layer of the eyeball: a. Physiology of the cornea; factors responsible for the transparency of cornea & functions of cornea	Read about corneal transparency and functions; Assignment on corneal physiology.
	Fibrous layer of the eyeball: b. Functions of the sclera	Prepare notes on scleral functions; Assignment on sclera's role in eye shape and protection.
Week 3	Vascular layer of the eyeball: a. Functions of the uvea	Study the functions of the uvea; Assignment on its role in nutrition, immunity, and inflammation.
	The lens and chambers of the eye: c. Basic physiology of the lens	Read about lens physiology; Assignment on the role of the lens in focusing and light refraction.
Week 4	The lens and chambers of the eye: d. Chambers of the eye	Study the structure and functions of the anterior and posterior chambers; Assignment on their role in eye health.
	Aqueous dynamics: a. Synthesis of aqueous	Read about aqueous humor synthesis; Assignment on how it affects intraocular pressure.
Week 5	Aqueous dynamics: b. Composition of aqueous	Study the composition of aqueous humor; Write an assignment on its role in the eye.

	Aqueous dynamics: c. Aqueous outflow	Read about the outflow mechanisms of aqueous humor; Assignment on glaucoma and its relation to outflow.
Week 6	Aqueous dynamics: d. Some important normal values, e.g.; intraocular pressure	Study intraocular pressure; Write an assignment on normal IOP values and their clinical importance.
	Aqueous dynamics: e. Functions of the aqueous	Read on the role of aqueous humor in maintaining eye shape and refractive properties; Assignment on its functions.
Week 7	Retina and the vitreous: a. Important elements in retinal image capturing like the photoreceptors, bipolar & ganglion cells	Study retinal structure and functions; Assignment on retinal image processing and cell types.
	Retina and the vitreous: b. Introduction to photochemistry of vision	Read on the photochemical processes in vision; Assignment on phototransduction and visual cycles.
Week 8	Retina and the vitreous: c. Adaptation by the eye	Study visual adaptation mechanisms; Write an assignment on dark and light adaptation.
	Neuro-ophthalmology and the pupil: a. The optic nerve	Read about the optic nerve structure and function; Assignment on optic nerve physiology.
Week 9	Neuro-ophthalmology and the pupil: b. The visual pathway	Study the visual pathway; Assignment on the neural processing of visual signals.
	Neuro-ophthalmology and the pupil: c. Outline of neural pathway for the pupillary reflex	Read about the pupillary reflex arc; Write an assignment on the neural pathways involved.
Week 10	Neuro-ophthalmology and the pupil: d. The 3rd, 4th & 6th Cranial nerves	Study cranial nerve functions; Assignment on the roles of the 3rd, 4th, and 6th cranial nerves in vision.
	Neuro-ophthalmology and the pupil: e. 5th & the 7th cranial nerves	Read on the functions of the 5th and 7th cranial nerves in ocular health; Write an assignment.
Week 11	Physiology of Extraocular muscles: a. Physiology of extraocular muscles; various types of extraocular movements & cardinal positions of gaze	Study the physiology of eye movements; Assignment on extraocular muscle functions and gaze positions.
	Physiology of Extraocular muscles: b. Extraocular muscle control and coordination	Prepare notes on eye movement control; Write an assignment on the neural control of eye movements.
Week 12	The orbit: a. Functions of the eyelids	Review and revise eyelid physiology; Practical case study analysis.
	The orbit: b. Functions of the lacrimal system	Study real-life cases on lacrimal system disorders; Practical discussion on tear film stability.
Week 13	Fibrous layer of the eyeball: a. Physiology of the cornea	Review and practical identification of corneal layers; Case study on corneal conditions.
	Fibrous layer of the eyeball: b. Functions of the sclera	Practical demonstration of scleral structure and functions.

Week 14	Vascular layer of the eyeball: a. Functions of the uvea	Practical observations on uveal functions and disorders.
	The lens and chambers of the eye: c. Basic physiology of the lens	Practical examination of lens physiology in different light conditions.
Week 15	Aqueous dynamics: a. Synthesis of aqueous	Demonstration of aqueous humor production and its effect on IOP.
	Aqueous dynamics: b. Composition of aqueous	Study and practical examination of aqueous humor composition.
Week 16	Retina and the vitreous: a. Important elements in retinal image capturing	Practical exploration of retinal elements using fundus cameras.
	Retina and the vitreous: c. Adaptation by the eye	Practical study of eye adaptation under varying lighting conditions.
Course Content (Lab)		
Week 1	The orbit: a. Functions of the eyelids	Observe eyelid structure and function through anatomical models.
Week 2	The orbit: b. Functions of the lacrimal system	Demonstrate lacrimal drainage and tear production in lab.
Week 3	Fibrous layer of the eyeball: a. Physiology of the cornea	Examine corneal transparency and function using optical devices and models.
Week 4	Fibrous layer of the eyeball: b. Functions of the sclera	Study scleral structure and its protective role through dissection models.
Week 5	Vascular layer of the eyeball: a. Functions of the uvea	Examine the uveal tract and discuss its role in ocular health.
Week 6	The lens and chambers of the eye: c. Basic physiology of the lens	Study the lens function using optical instruments.
Week 7	The lens and chambers of the eye: d. Chambers of the eye	Identify and observe the different chambers of the eye in anatomical models.
Week 8	Aqueous dynamics: a. Synthesis of aqueous	Practical demonstration of aqueous humor production using ocular models.
Week 9	Aqueous dynamics: b. Composition of aqueous	Perform experiments to demonstrate aqueous humor composition and its clinical significance.
Week 10	Aqueous dynamics: c. Aqueous outflow	Study aqueous humor outflow mechanisms in laboratory settings.
Week 11	Aqueous dynamics: d. Some important normal values, e.g.; intraocular pressure	Measure IOP in clinical settings and compare with normal values.
Week 12	Aqueous dynamics: e. Functions of the aqueous	Practical demonstration of aqueous humor functions in maintaining ocular pressure.
Week 13	Retina and the vitreous: a. Important elements in retinal image capturing	Use retinal cameras to capture retinal images and analyze them.
Week 14	Retina and the vitreous: b. Introduction to photochemistry of vision	Demonstrate light-to-signal conversion in the retina using visual stimulus models.
Week 15	Retina and the vitreous: c. Adaptation by the eye	Experiment with dark and light adaptation in the classroom setting.

Week 16	Physiology of Extraocular muscles: a. Physiology of extraocular muscles; various types of extraocular movements & cardinal positions of gaze	Practical session on extraocular muscle movements and their neural control.

Textbooks and Reading Material

- **"Clinical Anatomy and Physiology of the Visual System"** by Lee Ann Remington & Denise L. Allen (3rd Edition) – A comprehensive guide covering the anatomy and physiology of the visual system with clinical relevance.
- **"Ophthalmic Physiology"** by Richard S. Snell & Michael A. Lemp (5th Edition) – Detailed coverage of the physiological processes involved in vision and the optical system.
- **"Medical Physiology"** by Walter F. Boron & Emile L. Boulpaep (3rd Edition) – Offers a broad overview of human physiology with sections on sensory systems and vision.
- **"Human Physiology"** by Stuart Fox (14th Edition) – A well-rounded textbook providing foundational knowledge on the physiology of the human body, including vision.
- **"Fundamentals of Medical Physiology"** by M. L. Gulani (2022) – A focused resource for optometry students, covering core aspects of medical physiology with emphasis on eye physiology.
- **"The Physiology of the Eye"** by K. S. Chawla (2020) – In-depth insights into the anatomy and physiology of the eye, ideal for vision science students.
- **"Eye and Vision"** by Michael S. Kalloniatis & Mark H. L. Luu (2019) – Focuses on the visual mechanisms and sensory processing of vision.

Teaching Learning Strategies

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   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
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4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-109	Credit Hours	2 (2+0)
Course Title	Pakistan Studies				

Course Introduction

This course is designed to provide students with a comprehensive exploration of Pakistan`s identity, spanning geographical, historical, and cultural dimensions. It delves into the diverse landscapes, ancient civilizations, and rich cultural heritage that define Pakistan. Moreover, it examines the socio-cultural and political transformations in Pakistan over time including democratic transitions and military interventions. The aim of this course is to inculcate in students a nuanced understanding of Pakistan`s, present, and potential future trajectories, enabling them to critically evaluate the complex dynamics shaping the development.

Learning Outcomes

On the completion of the course, the students will:

1. Have enhanced knowledge of the geographical, historical, and political aspects of Pakistan.
2. Understand the society and culture of Pakistan.
3. Understand explain the Socio-economic developments in Pakistan.
4. Explore contemporary issues and challenges faced by Pakistan and their implications for the future..

Course Content

1. **Introduction to Pakistan**
   - Geographical location and significance.
   - Historical background ancient civilizations in the region.
   - Factors leading to the creation of Pakistan
2. **Political History of Pakistan:**
   - Formative phase.
   - Military interventions and democratic transitions.
3. **Geography of Pakistan:**
   - Physiography: Mountains, Plains, Plateaus, deserts, valleys and coastal areas.
   - River systems: Indus River and its tributaries.
   - Climatic regions of Pakistan.
4. **Society and Culture of Pakistan:**
   - Socio-cultural diversity.
   - Languages and literature of Pakistan.
5. **Economic Development of Pakistan:**
   - Agriculture and industrial sectors of Pakistan.
   - Economic challenges of Pakistan.

Teaching Learning Strategies

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3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-201	Credit Hours	3 (3+0)
Course Title	Human Genetics				

Course Introduction

This course provides a comprehensive overview of the principles of human genetics, focusing on inheritance, genetic variation, and gene expression. Designed for Allied Health Sciences students, it explores Mendelian inheritance, chromosomal structure, genetic mutations, and genetic disorders. Students will gain knowledge on the role of genetics in health, disease, and personalized medicine. Through lectures, laboratory work, and case studies, the course highlights the application of genetic principles in clinical settings, including genetic testing and counseling. Ethical considerations in genetics and its impact on healthcare practices will also be emphasized.

Learning Outcomes

On the completion of the course, the students will:

- **Understand the fundamentals of human genetics**: Explain the principles of inheritance, including Mendelian patterns, and the molecular mechanisms of gene expression.
- **Analyze genetic variation**: Identify how genetic variation occurs within populations and its role in human traits, health, and disease.
- **Interpret genetic disorders**: Understand the causes, inheritance patterns, and clinical implications of common genetic disorders.
- **Apply genetic knowledge in healthcare**: Demonstrate the ability to use genetic testing, counseling, and family history in clinical settings.
- **Evaluate ethical issues in genetics**: Critically assess the ethical, legal, and social implications of genetic technologies in healthcare.
- **Integrate genetics into clinical practice**: Discuss the role of genetics in personalized medicine, preventive health strategies, and disease management.

Course Content (Theory)		Assignments/Readings
Week 1	**Introduction to Genetics** Overview of basic genetic concepts, the history of genetics, and the impact of genetics on society.	Answer questions on the role of genetics in society.
	Introduction to Genetics Genetic terminology, scientific method in genetics, ethical considerations.	Complete a glossary of key genetic terms.
	Introduction to Genetics Ethical dilemmas in genetics, historical case studies (e.g., Eugenics, genetic screening).	Watch video on the ethics of genetic testing.
Week 2	**Mendelian Genetics** Mendel's Laws of Inheritance, monohybrid cross, and basic Punnett squares.	Problem set on monohybrid crosses.
	Mendelian Genetics Dihybrid crosses, inheritance of two traits, and Punnett square applications.	Complete dihybrid cross problems.
	Mendelian Genetics Inheritance patterns: dominance, recessive, co-dominance, incomplete dominance.	Research and present a case of co-dominance or incomplete dominance.
Week 3	**Human Chromosomes** Structure of chromosomes, karyotypes, and chromosomal abnormalities.	Read Chapter 3 and analyze a karyotype.
	Human Chromosomes Chromosomal disorders: Down syndrome, Turner syndrome, Klinefelter syndrome.	Watch video on chromosomal abnormalities and answer questions.
	Human Chromosomes	Quiz on chromosomal disorders.

	Sex determination, the role of sex chromosomes (X and Y), and sex-linked traits.	
Week 4	**Molecular Genetics** DNA structure: double helix, nucleotides, and base pairing.	Read Chapter 4 and complete DNA structure worksheet.
	Molecular Genetics DNA replication: processes, enzymes involved, and the semi-conservative model.	Write a summary of the DNA replication process.
	Molecular Genetics Mechanisms of DNA repair, mutations, and their effects on genetic information.	Complete a mutation case study.
Week 5	**Molecular Genetics** Transcription: process of RNA synthesis, RNA polymerase, and types of RNA.	Complete transcription process diagram.
	Molecular Genetics Translation: protein synthesis, ribosomes, tRNA, and codon recognition.	Read Chapter 5, answer questions on translation.
	Molecular Genetics Gene regulation: operons, transcription factors, and eukaryotic gene regulation.	Research gene regulation in eukaryotes.
Week 6	**Genetic Variation** Types of genetic variation: mutations, polymorphisms, and their causes.	Complete worksheet on mutation types.
	Genetic Variation Genetic polymorphisms: single nucleotide polymorphisms (SNPs) and their implications.	Write a report on SNPs and their significance in human genetics.
	Genetic Variation How genetic variation arises in populations: mutation, recombination, and genetic drift.	Complete problems on Hardy-Weinberg equilibrium.
Week 7	**Population Genetics** Hardy-Weinberg equilibrium: assumptions, equation, and applications.	Quiz on Hardy-Weinberg principles.
	Population Genetics Genetic drift, founder effect, and bottleneck effect in small populations.	Review case study on genetic drift.
	Population Genetics Natural selection: how it affects genetic variation and evolution.	Submit a case study on natural selection.
Week 8	**Population Genetics** Gene flow and its impact on population genetics.	Answer questions on gene flow and human migration.
	Population Genetics Evolution: mechanism of evolution and its genetic basis.	Read Chapter 6, complete review questions.
	Population Genetics Human migration patterns and their genetic implications.	Research genetic evidence of human migration.
Week 9	**Genetics of Inheritance** Autosomal dominant and recessive inheritance patterns (examples and pedigrees).	Solve problems on autosomal inheritance patterns.
	Genetics of Inheritance Pedigree analysis and applications to inheritance of traits and disorders.	Complete pedigree analysis of a family.
	Genetics of Inheritance Autosomal and X-linked recessive inheritance patterns (e.g., color blindness, hemophilia).	Quiz on X-linked inheritance.

Week 10	**Genetics of Inheritance** Mitochondrial inheritance: inheritance via maternal line.	Submit a mitochondrial inheritance case study.
	Genetics of Inheritance Inheritance of multifactorial traits (e.g., height, skin color).	Research and present a multifactorial trait example.
	Genetics of Inheritance Non-Mendelian inheritance: genomic imprinting, epigenetics.	Read articles on epigenetics and answer questions.
Week 11	**Genomics and Personalized Medicine** Introduction to genomics and its applications in healthcare.	Complete a discussion on personalized medicine.
	Genomics and Personalized Medicine Genome sequencing technologies (e.g., NGS, microarrays), and their use in diagnosis and treatment.	Research a case study on personalized genomics.
	Genomics and Personalized Medicine Pharmacogenomics: how genetic information influences drug response.	Write a report on pharmacogenomics in healthcare.
Week 12	**Genetic Disorders** Overview of genetic disorders: single-gene disorders (e.g., cystic fibrosis, sickle cell anemia).	Complete an assignment on a genetic disorder.
	Genetic Disorders Chromosomal disorders: Down syndrome, Edwards syndrome, Patau syndrome.	Watch a video on chromosomal disorders and answer questions.
	Genetic Disorders Multifactorial genetic disorders (e.g., cleft lip, type 2 diabetes).	Research and present on a multifactorial disorder.
Week 13	**Genetic Disorders** Cancer genetics: oncogenes, tumor suppressor genes, and inherited cancer syndromes.	Write a case study on inherited cancer syndromes.
	Genetic Disorders Mitochondrial diseases and their inheritance patterns.	Complete a worksheet on mitochondrial inheritance.
	Genetic Disorders Genetic testing: types (e.g., diagnostic, predictive, carrier testing), and ethical issues.	Submit a report on genetic testing and ethical considerations.
Week 14	**Ethical and Social Issues in Genetics** Ethical considerations in genetic research and testing.	Read Chapter 10 and answer ethical case study questions.
	Ethical and Social Issues in Genetics Genetic counseling: role, process, and applications in healthcare.	Complete a role-play exercise on genetic counseling.
	Ethical and Social Issues in Genetics Social implications of genetic testing, privacy, discrimination, and the future of genetics.	Write an essay on the social impact of genetic technologies.
Week 15	**Ethical and Social Issues in Genetics** Regulation of genetic technologies: laws and policies, such as genetic patenting and CRISPR regulation.	Research and present on genetic patents.
	Ethical and Social Issues in Genetics Public perception of genetics and genetic testing: societal attitudes and ethical frameworks.	Complete survey on public attitudes toward genetic testing.
	Ethical and Social Issues in Genetics Discussion: Balancing the benefits and risks of genetic technology.	Group debate on ethical issues in genetics.
Week 16	**Review and Discussion** Review of course content, major concepts, and upcoming assessment.	Prepare for the final exam.

	Final Review Review of key topics: molecular genetics, inheritance, genetic disorders, and ethical/social issues.	Final exam preparation.
	Final Exam In-class exam covering all topics discussed in the course.	---

Textbooks and Reading Material

- **Human Genetics: Concepts and Applications** by Ricki Lewis
- **Genetics in Medicine** by James F. Thompson and Margaret A. S. Desnick
- **Principles of Genetics** by D. Peter Snustad and Michael J. Simmons
- **Molecular Biology of the Gene** by James D. Watson, Tania A. Baker, and Stephen P. Bell

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3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-202	Credit Hours	3 (2+1)
Course Title	Introduction to Pharmacology				

Course Introduction

This course provides a comprehensive introduction to the fundamental principles of pharmacology, focusing on the **pharmacokinetics** (how the body processes drugs) and **pharmacodynamics** (how drugs affect the body) of various substances. The course aims to familiarize students with the core concepts of pharmacology, including the different types of diseases, and how the body interacts with and metabolizes drugs. Students will explore the mechanisms of action, therapeutic uses, and potential adverse effects of important drugs, equipping them with a solid understanding of drug therapy. By the end of the course, students will have a foundational knowledge of how drugs work, their role in treatment, and their impact on the body.

Learning Outcomes

On the completion of the course, the students will:

- Understand the Pharmacokinetics and Pharmacodynamics of Drugs: Demonstrate knowledge of how drugs are absorbed, distributed, metabolized, and excreted by the body, and how they produce their effects.
- Explain Drug Mechanisms of Action: Understand and describe how different types of drugs work at the molecular, cellular, and systemic levels to treat diseases.
- Identify Therapeutic Uses and Adverse Effects of Drugs: Recognize the therapeutic indications for various drugs and understand their potential side effects and risks.
- Apply Pharmacological Knowledge to Clinical Practice: Use pharmacological principles to guide the selection, administration, and monitoring of drug therapies in real-world healthcare settings.
- Promote Safe and Rational Drug Use: Understand the importance of safe drug use practices, including recognizing drug interactions and minimizing adverse effects for optimal patient outcomes.

Course Content (Theory)		Assignments/Readings
Week 1	**Introduction to Pharmacology**: Definition and branches of pharmacology. Definition and sources of drugs.	Reading: Chapter on Pharmacology, focusing on definitions and branches of the field.
	Routes of Drug Administration: Advantages and disadvantages of various routes of drug administration.	Assignment: List and compare different routes of drug administration.
Week 2	**Pharmacokinetics I**: Absorption, distribution, metabolism, and elimination of drugs. Factors affecting these processes.	Reading: Chapter on pharmacokinetics.
	Pharmacokinetics II: Pharmacokinetic parameters (Vd, Cl, Biological Half-life, Bioavailability).	Assignment: Solve problems related to pharmacokinetic parameters.
Week 3	**Pharmacodynamics I**: Drug action, receptors, and their molecular structures.	Reading: Chapter on pharmacodynamics.
	Pharmacodynamics II: Agonists, partial agonists, inverse agonists, antagonists (competitive and non-competitive).	Assignment: Prepare a comparison chart for different types of agonists and antagonists.
Week 4	**Pharmacodynamics III**: Median lethal dose (LD50), median effective dose (ED50), and therapeutic index.	Assignment: Discuss the significance of LD50, ED50, and Therapeutic Index in drug safety.
	Dose-Response Relationships: Understanding how dose affects drug response.	Reading: Chapter on dose-response relationships.
Week 5	**Drug Classification I**: Drugs acting on the cardiovascular system (Angina, Coagulants, Anti-coagulants).	Assignment: Create a summary table of drugs used to treat cardiovascular conditions.
	Drug Classification II: Anti-hypertensives, diuretics, and their mechanisms of action.	Reading: Chapter on cardiovascular drugs.

Week 6	**Drugs Acting on Gastrointestinal Tract I**: Treatment of peptic ulcer (Antacids, H2 antagonists, Proton pump inhibitors).	Assignment: Compare the mechanisms of action of different anti-ulcer drugs.
	Drugs Acting on Gastrointestinal Tract II: Emesis and anti-emetics.	Reading: Chapter on gastrointestinal pharmacology.
Week 7	**Anti-inflammatory, Antipyretic, and Analgesic Agents**: Mechanisms and uses.	Assignment: Create a mind map of common anti-inflammatory and analgesic drugs.
	Drugs Acting on CNS & ANS I: Sedatives, hypnotics, and antidepressants.	Reading: Chapter on CNS and ANS drugs.
Week 8	**Drugs Acting on CNS & ANS II**: Antiepileptic drugs, CNS stimulants, and neuromuscular blockers.	Assignment: Identify and categorize different CNS drugs with their uses and side effects.
	Antimicrobials I: Basic principles of chemotherapy, antibacterial agents (sulfonamides, penicillin, etc.).	Reading: Chapter on antimicrobial drugs.
Week 9	**Antimicrobials II**: Protein synthesis inhibitors (Aminoglycosides, Tetracyclines, Macrolides), Nucleic acid synthesis inhibitors (Quinolones).	Assignment: Prepare a comparison table of antibacterial drugs and their mechanisms of action.
	Antimicrobials III: Anti-mycobacterial drugs, antifungal drugs, and antivirals.	Reading: Chapter on antifungal and antiviral drugs.
Week 10	**Drug Calculations I**: Basic arithmetic (addition, subtraction, multiplication, and division).	Assignment: Solve drug calculation problems related to dosages and unit conversions.
	Drug Calculations II: Calculation of dosage by weight, solution strength, and unit conversions.	Reading: Chapter on drug calculations and practical exercises.
Week 11	**Rights of Medication Administration I**: Overview of the rights and their importance in drug administration.	Assignment: Write a short essay on the Rights of Medication Administration.
	Rights of Medication Administration II: Diagnostic imaging agents and their usage.	Reading: Chapter on diagnostic imaging agents and medication rights.
Week 12	**Legal Policies and Responsibilities in Drug Handling I**: Overview of drug laws and regulations.	Assignment: Research local drug handling laws and create a summary.
	Legal Policies and Responsibilities in Drug Handling II: Ethical considerations and handling controlled substances.	Reading: Chapter on drug handling laws and ethics.
Week 13	**Pharmacokinetics Review**: Detailed review and case studies of pharmacokinetics and drug metabolism.	Assignment: Review case studies on pharmacokinetics and answer questions.
	Pharmacodynamics Review: Detailed review and case studies of drug mechanisms and dose-response relationships.	Reading: Chapter on pharmacodynamics case studies.
Week 14	**Cardiovascular System Drugs Review**: Comprehensive review of drugs acting on the cardiovascular system.	Assignment: Prepare a presentation on drugs for cardiovascular diseases, including their mechanisms and side effects.
	Gastrointestinal Drugs Review: Review of drugs acting on the gastrointestinal tract and their therapeutic uses.	Assignment: Prepare a comparison of drugs for peptic ulcers, their actions, and side effects.
Week 15	**CNS & ANS Drugs Review**: Review of drugs acting on the CNS and ANS.	Assignment: Review the side effects and therapeutic uses of CNS and ANS drugs.

	Antimicrobials Review: Comprehensive review of antibiotics, antivirals, and antifungals.	Reading: Chapter on antimicrobial therapy and resistance mechanisms.
Week 16	**Final Review**: Recap of drug calculations, rights of medication administration, and legal responsibilities.	Assignment: Final review quiz covering all aspects of pharmacology, calculations, and legal responsibilities.
	Course Wrap-up and Final Exam Preparation: Summary of key concepts and preparation for the final exam.	Assignment: Study for final exam and review all course content.
Course Content (Lab)		**Assignments/Readings**
Week 1	**Introduction to Pharmacology and Experimental Pharmacology**: Overview of pharmacology and the significance of experimental pharmacology.	Reading: Chapter on Introduction to Experimental Pharmacology.
Week 2	**Handling of Drug Labelling Information**: Learn how to interpret and handle drug labelling information correctly.	Assignment: Prepare a report on the importance of proper drug labelling.
Week 3	**Study of Animals Used for Experimental Pharmacology**: Overview of animals used in pharmacological experiments and ethical considerations.	Reading: Chapter on animals in experimental pharmacology.
Week 4	**Pyrogenic Test of a Given Sample**: Perform a pyrogenic test to check for the presence of pyrogens in a drug sample.	Assignment: Document the procedure and results of the pyrogenic test.
Week 5	**Study of Anticoagulant Effect of Drugs on Clotting Time**: Measure the effect of an anticoagulant on blood clotting time.	Reading: Chapter on anticoagulants and their mechanisms of action.
Week 6	**Preparation of Standard Solutions**: Prepare Ringer's solution/Tyrode solution and discuss their pharmacological relevance.	Assignment: Prepare a report on the composition and uses of Ringer's and Tyrode solutions in experimental pharmacology.
Week 7	**Study of the Effects of Pilocarpine on Rabbit's Eyes**: Observe the effects of Pilocarpine on the pupil size of rabbits.	Reading: Chapter on Pilocarpine and its mechanism of action.
Week 8	**Conversion of Drug into Excretory Form**: Study the conversion of drugs into their excretory forms, including metabolism.	Assignment: Prepare a report on the different phases of drug metabolism and excretion.
Week 9	**Effect of Drug on Blood Pressure**: Study the effect of a drug on rabbit blood pressure using a suitable instrument.	Reading: Chapter on the effects of drugs on cardiovascular parameters.
Week 10	**Effect of Drug on Respiration**: Measure the impact of a drug on the respiratory rate of rabbits.	Assignment: Write a report on the effects of respiratory drugs and their mechanisms.
Week 11	**Study of Drug-Induced Tachycardia**: Observe the effects of drugs on heart rate, specifically focusing on tachycardia.	Reading: Chapter on drugs that influence heart rate and their pharmacological actions.
Week 12	**Toxicity Study of Drug on Liver Function**: Evaluate the effect of a drug on liver enzymes in animal models.	Assignment: Document and analyze the results of a drug toxicity study on liver function.
Week 13	**Measurement of Renal Function After Drug Administration**: Study the impact of drugs on kidney function.	Reading: Chapter on the effects of drugs on renal function.
Week 14	**Effect of Drug on Gastrointestinal Motility**: Investigate the effects of drugs on gastrointestinal motility.	Assignment: Prepare a comparison report on drugs affecting gastrointestinal motility.
Week 15	**Drug-Induced Sedation Study**: Measure the effect of a drug on the sedation level in animals.	Reading: Chapter on sedative drugs and their clinical uses.

Week 16	**Final Practical Report & Review**: Consolidate practical knowledge and present findings from previous experiments.	Assignment: Prepare a final report summarizing all experiments and their pharmacological relevance.

Textbooks and Reading Material

- Bray, G. A., & Bouchard, C. (2019). *Handbook of Obesity, Two-Volume Set.* CRC Press.
- Whalen, K., Feild, C., & Radhakrishnan, R. (2018). *Pharmacology.* LWW.
- Stawicki, S. P., Firstenberg, M. S., Galwankar, S. C., Izurieta, R., & Papadimos, T. (2021). *Contemporary Developments and Perspectives in International Health Security: Volume 1.* BoD – Books on Demand.
- Wang, B. (2022). *Medical Equipment Maintenance: Management and Oversight.* Springer Nature.
- Whalen, K. (2018). *Lippincott® Illustrated Reviews: Pharmacology.* Wolters Kluwer India Pvt.
- Katzung, B. G., & Trevor, A. J. (2020). *Basic and Clinical Pharmacology, 15e.* McGraw-Hill Education / Medical.
- Ritter, J. M., Flower, R. J., Henderson, G., Loke, Y. K., MacEwan, D., Robinson, E., & Fullerton, J. (2023). *Rang & Dale's Pharmacology* (E-book). Elsevier Health Sciences.

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Programme	Optometry & Vision Sciences	Course Code	OVS-203	Credit Hours	3(2+1)
Course Title	Biostatistics				

Course Introduction

Statistics is the science of collecting, analyzing, interpreting, and presenting numerical data. When applied to living organisms, it is referred to as *biostatistics*. Biologists use biostatistics to address research questions in medicine, such as identifying the underlying causes of diseases, estimating life expectancy for individuals with chronic conditions, or determining the factors that can extend a patient's survival.

Learning Outcomes

On the completion of the course, the students will:

- **Demonstrate proficiency in statistical concepts**: Understand and explain core statistical principles and methods used in biostatistics.
- **Apply biostatistical techniques**: Use appropriate statistical methods to analyze and interpret biological and medical data in various research contexts.
- **Analyze and interpret data confidently**: Conduct data analysis using statistical software, and interpret results accurately for biological and medical studies.
- **Evaluate research critically**: Assess the validity of statistical methods used in biological and medical research, identifying limitations and potential biases.
- **Communicate statistical results effectively**: Present statistical findings clearly through reports, tables, charts, and graphs, making them accessible to both experts and non-experts.
- **Understand ethical and practical considerations**: Address ethical issues in data collection, analysis, and interpretation, ensuring integrity in biostatistical research.
- **Integrate biostatistics into decision-making**: Apply statistical analysis to make informed decisions in public health, medicine, and healthcare policy.
- **Contribute to evidence-based healthcare**: Use biostatistical knowledge to support research, policy-making, and patient care through scientifically grounded insights.

	Course Content (Theory)	Assignments/Readings
Week 1	Introduction to Biostatistics and its scope.	Read: Introduction to Biostatistics.
	Collection of primary and secondary data.	Read: Data Collection Methods.
Week 2	Editing of data.	Complete exercises on data editing.
	Presentation of data: tabulation, classification, visual presentation (diagrams and graphs in Microsoft Excel).	Practice creating data tables and graphs in Excel.
Week 3	Presentation of data in SPSS.	SPSS tutorial: Data presentation in SPSS.
	Measures of central tendency: Arithmetic Mean by direct and shortcut method.	Complete problems on calculating arithmetic mean.
Week 4	Measures of central tendency: Geometric Mean, Harmonic Mean, Mode, Median, ED50 (LD50 in detail), Quantile.	Read and solve exercises on measures of central tendency.
	Measures of dispersion: Range, Quartile Deviation, Mean Deviation.	Practice calculating range and deviation measures.
Week 5	Measures of dispersion: Standard Deviation (direct and shortcut method), Variance, and their Coefficients.	Solve problems on standard deviation and variance.
	Correlation: Simple correlation table, Rank correlation.	Read: Correlation and solve related problems.
Week 6	Correlation: Partial and Multiple correlations.	Complete assignments on partial and multiple correlations.
	Regression and method of least squares.	Solve problems on regression and least squares method.

Week 7	Probability: Concept of probability, Laws of probability.	Read: Basics of Probability.
	Permutation and combination, Probability distributions.	Complete exercises on permutations, combinations, and probability.
Week 8	Binomial distribution and its fitting to observed data.	Solve problems on binomial distribution.
	Poisson distribution and its fitting to observed data.	Read and practice problems on Poisson distribution.
Week 9	Normal distribution and its application.	Solve problems on normal distribution.
	Sampling methods and basic design.	Read: Sampling Techniques and Design.
Week 10	Hypothesis testing: Introduction and concepts.	Complete exercises on hypothesis testing.
	Chi-square test: Concepts and application.	Read: Chi-square tests and solve problems.
Week 11	Student's t-test: Concepts and application.	Solve problems on t-test.
	Analysis of Variance (ANOVA): One-way ANOVA.	Complete exercises on one-way ANOVA.
Week 12	Two-way ANOVA and its application.	Practice problems on two-way ANOVA.
	How to use SPSS: Importing data, Frequency calculation.	SPSS tutorial: Import data and calculate frequencies.
Week 13	SPSS: Mean, Mode calculations in SPSS.	Practice calculating mean and mode in SPSS.
	SPSS: Chi-square test in SPSS.	Solve chi-square problems using SPSS.
Week 14	SPSS: t-test in SPSS.	Practice conducting t-test in SPSS.
	SPSS: ANOVA in SPSS.	Solve ANOVA problems using SPSS.
Week 15	Review of key biostatistical concepts and techniques.	Complete review exercises on biostatistical methods.
	Practical session: SPSS for data analysis (Hands-on practice).	Submit assignment on SPSS data analysis.
Week 16	Case study and application of biostatistics in healthcare.	Read case study and prepare a report.
	Course wrap-up and final assessment.	Review course materials and prepare for final exam.
Course Content (Lab)		**Assignments/Readings**
Week 1	**Data Collection and Editing**: Collect primary data related to a research question; clean and edit data by identifying and correcting errors.	Practice data collection and data editing exercises.
Week 2	**Data Presentation**: Create tabular presentations in Microsoft Excel or SPSS; generate bar graphs, pie charts, and scatter plots to represent data visually.	Submit data presentation tasks using Excel or SPSS.
Week 3	**Measures of Central Tendency**: Calculate arithmetic mean, geometric mean, harmonic mean, and mode using real datasets.	Solve exercises on calculating measures of central tendency.
Week 4	**Measures of Dispersion**: Compute range, variance, and standard deviation for data samples.	Complete problems on dispersion measures.

Week 5	**Correlation Analysis**: Calculate correlation coefficients (e.g., Pearson, Spearman) and interpret their strength and direction.	Practice calculating and interpreting correlation coefficients.
Week 6	**Regression Analysis**: Perform simple linear regression analysis using the method of least squares.	Submit regression analysis reports using real data.
Week 7	**Probability Distributions**: Simulate binomial and Poisson distributions using random number generators; create histograms for data visualization.	Complete exercises on binomial and Poisson distributions.
Week 8	**Sampling Techniques**: Practice random sampling and systematic sampling on a given dataset; discuss advantages and disadvantages of different sampling methods.	Submit a report on sampling techniques and their applications.
Week 9	**Hypothesis Testing**: Formulate null and alternative hypotheses for a research question; perform chi-square tests on real data.	Perform chi-square tests and submit the results.
Week 10	**Hypothesis Testing**: Conduct t-tests on real data for comparing means.	Complete exercises on t-tests using real-world datasets.
Week 11	**Hypothesis Testing**: Conduct one-way and two-way ANOVA tests to compare group means.	Solve problems on one-way and two-way ANOVA.
Week 12	**SPSS Usage**: Import datasets into SPSS; calculate basic statistical measures using SPSS functions.	Import a dataset into SPSS and perform basic analysis.
Week 13	**SPSS Usage**: Perform chi-square tests, t-tests, and ANOVA using SPSS software.	Practice conducting chi-square, t-test, and ANOVA in SPSS.
Week 14	**Real-world Application**: Analyze a case study or practical scenario involving real data; apply appropriate statistical tests to draw conclusions.	Analyze a real-world case study and prepare a report.
Week 15	**Report Writing**: Prepare a comprehensive report detailing steps taken, calculations, and results obtained in each practical task.	Submit a comprehensive lab report summarizing all tasks.
Week 16	**Final Review and Discussion**: Review and discuss the application of biostatistical techniques to real-world problems; finalize report writing.	Submit the final report and prepare for the lab assessment.

Textbooks and Reading Material

- Pagano, M., & Gauvreau, K. (2018). *Principles of Biostatistics*. Cengage Learning.
- Glantz, S. A., & Slinker, B. K. (2017). *Primer of Applied Regression & Analysis of Variance*. McGraw-Hill Education.
- Dawson, B., & Trapp, R. G. (2018). *Basic & Clinical Biostatistics*. McGraw-Hill Education.
- Sullivan, L. M. (2017). *Essential Biostatistics: A Nonmathematical Approach*. Jones & Bartlett Learning.
- Ghasemi, A., & Zahediasl, S. (2019). *Normality Tests for Statistical Analysis: A Guide for Non-Statisticians*. Academic Press.
- Rosner, B. (2019). *Fundamentals of Biostatistics*. Cengage Learning.
- Aho, K., & Derryberry, D. (2018). *Statistics and Data Analysis for Microarrays Using R and Bioconductor*. CRC Press.
- Bland, M. (2019). *An Introduction to Medical Statistics*. Oxford University Press.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.

3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-204	Credit Hours	2 (2+0)
Course Title	Visual Optics				

Course Introduction

The **Visual Optics** course is designed for undergraduate students in Optometry and Vision Sciences. It aims to provide a comprehensive understanding of the optical principles governing the human visual system. This course covers the physics of light, the behaviour of light as it passes through the eye, and the optical components of the eye responsible for vision. Students will explore topics such as refraction, the interaction of light with the ocular structures (cornea, lens, retina), accommodation, and the various visual defects (myopia, hyperopia, astigmatism) that affect vision.

The course will also examine the role of optical instruments like glasses, contact lenses, and refractive surgery in correcting vision problems. The understanding of visual optics is essential for optometrists and vision scientists as it forms the foundation for assessing and managing visual disorders.

Learning Outcomes

On the completion of the course, the students will:

- Explain the fundamental principles of light and its behavior, including reflection, refraction, and dispersion.
- Understand the optical components of the eye, such as the cornea, lens, and retina, and their role in focusing light.
- Identify and describe common refractive errors (myopia, hyperopia, astigmatism) and explain their optical causes.
- Analyze the process of accommodation and vergence and their importance in clear vision.
- Apply knowledge of visual optics to correct refractive errors using optical instruments like spectacles, contact lenses, and refractive surgery techniques.

Course Content (Theory)		Assignments/Readings
Week 1	Review of Geometric Optics: Vergence and power	Textbook: "Visual Optics" by K. S. Chawla (Chapters 1 & 2)
	Conjugacy, Object space, and image space	Assignment: Problem set on image formation and vergence
Week 2	Sign convention, Spherical refracting surface	Reading: "Clinical Anatomy and Physiology of the Visual System" by Remington & Allen
	Spherical Mirror, Catoptric power	Assignment: Practice problems on spherical mirrors
Week 3	Cardinal points, Magnification	Reading: "Ophthalmic Optics" by David B. Elliott (Chapter 3)
	Light and visual function, Clinical relevance of Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism	Review of clinical case studies related to visual phenomena
Week 4	Aberration and application: Spherical and Chromatic	Assignment: Research paper on optical aberrations
	Optics of ocular structures: Cornea and aqueous	Reading: "Optics of the Eye" by B. D. South
Week 5	Crystalline lens, Vitreous	Assignment: Prepare a report on the optics of the human eye
	Schematic and reduced eye	Reading: "Essentials of Ophthalmic Optics" by Kenneth G. McCready
Week 6	Basic aspects of vision: Visual acuity	Assignment: Clinical case study analysis of visual acuity

	Light and dark adaptation, Color vision	Reading: "Physiology of the Eye" by Schlegel
Week 7	Spatial and temporal resolution	Assignment: Design an experiment on visual resolution
	Science of measuring visual performance and its clinical application	Review clinical measurement techniques
Week 8	Refractive anomalies and their causes: Etiology, Contributing variabilities, Populating distributions	Textbook reading: "Principles of Visual Optics" by H. S. G. Munnerlyn
	Optical component measurement, Growth of eye in relation to refractive errors	Assignment: Report on eye growth and refractive error relationship
Week 9	Visual acuity: Definition, specification, measurement, and recording	Textbook: "Visual Perception" by A. D. G. Kline
	Test types for distance and near visual acuity	Assignment: Comparison of visual acuity charts
Week 10	Illumination of consultation room, Contrast sensitivity	Reading: "Clinical Refraction" by J. S. Miller
	Trial set & trial frame & phoropter – advantages and disadvantages	Assignment: Experiment on trial frame usage
Week 11	Refractive conditions: Emmetropia/Ametropia, Myopia	Textbook: "Optometric Care of the Aging Adult" by William H. Bruce
	Hyperopia, Astigmatism, Anisometropia	Assignment: Research report on astigmatism and anisometropia
Week 12	Presbyopia, Aphakia, Pseudophakia, Biometry	Reading: "Ophthalmic Optics" by David Elliott
	Axial vs refractive ametropia	Textbook: "Fundamentals of Optics" by Jenkins & White
Week 13	Accommodation: Mechanism, Range & amplitudes of accommodation	Assignment: Review accommodation theories
	Anomalies of accommodation	Textbook: "Visual Optics" by K. S. Chawla
Week 14	Convergence: Types, Measurement & Anomalies	Reading: "Clinical Optometry" by Barry A. Duane
	Relation between accommodation & convergence	Assignment: Case study on accommodation and convergence
Week 15	Retinoscopy (Static & Dynamic): Principle, instrumentation & Types	Reading: "Clinical Refraction" by J. S. Miller
	Procedure & Interpretation of findings – Transposition & Spherical equivalent	Assignment: Retinoscopy practice problems
Week 16	Dynamic retinoscopy: Methods, Radical retinoscopy	Textbook: "Refraction & Binocular Vision" by Tarek Shaarawy
	Cycloplegic refraction, Effective power & magnification	Reading: "Refraction Techniques" by Michael A. Lemp
Course Content (Lab)		**Practical**
Week 1	Study of Purkinje images I & II, III & IV	Practical: Study Purkinje images and their relation to ocular optics
Week 2	Mathematical models of the eye - Emmetropia, Hyperopia, Myopia	Practical: Work with trial lenses and accessories to model refractive states
Week 3	Visual acuity measurement & recording (Distance & Near)	Practical: Perform visual acuity tests with various charts
Week 4	Retinoscopy – Practice of retinoscopy in Emmetropia, Myopia, Hypermetropia, Astigmatism	Practical: Practice dry & wet retinoscopy techniques

Week 5	Retinoscopy – Practice in Anisometropia, Presbyopia, Aphakia, Pseudophakia, Media opacities	Practical: Retinoscopy in different refractive conditions
Week 6	Interpretation of retinoscopic findings, Subjective verification	Practical: Interpret retinoscopy findings and verify with subjective refraction
Week 7	Prescription writing, Methods of differentiating axial vs refractive ametropia	Practical: Write prescriptions and differentiate axial and refractive ametropia
Week 8	Dynamic retinoscopy – Various methods	Practical: Perform dynamic retinoscopy and interpret results
Week 9	Radical retinoscopy & Mohindra's near retinoscopy	Practical: Practice radical and Mohindra's retinoscopy methods
Week 10	Subjective refraction: Principle, Astigmatic chart, Binocular balancing	Practical: Use astigmatic charts for subjective refraction
Week 11	Cycloplegic Refraction	Practical: Perform cycloplegic refraction using cycloplegic agents
Week 12	Measurement of range & amplitude of accommodation	Practical: Measure accommodation range in subjects
Week 13	Measurement of near point of convergence	Practical: Use techniques to measure near point of convergence
Week 14	Convergence measurement & anomalies	Practical: Test for convergence anomalies in clinical settings
Week 15	Study of Accommodation and Convergence	Practical: Analyze relationship between accommodation and convergence
Week 16	Final Practical Evaluation	Practical: Comprehensive evaluation of all practical skills learned

Textbooks and Reading Material

- Duke Elder's practice of refraction, David Abrams – 10th edition
- Clinical refraction, Irwin.M.Borish
- Primary care Optometry, Theodore Grosvenor – 4th edition
- Clinical pearls in refractive care, D.Leonard Werner, Leonard.J.Press

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation

4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-205	Credit Hours	2 (2+0)
Course Title	Physical & Geometric Optics				

Course Introduction

This course on **Physical & Geometric Optics** introduces students to the principles and theories behind the behavior of light and optical systems. Students will explore both the theoretical foundations and practical applications of optics, including wave theory, diffraction, interference, and polarization. The course also covers optical phenomena in various materials, such as lenses, mirrors, and optical fibers. A hands-on approach is emphasized through practical exercises, including experiments with light interference, diffraction patterns, and optical instruments.

Through the study of geometric optics, students will learn about the behavior of light rays, the formation of images in mirrors and lenses, and the properties of optical systems. Physical optics topics such as diffraction, polarization, and the properties of light will also be explored. The course aims to provide students with a deep understanding of optical systems' functioning, crucial for applications in fields like optometry, physics, and engineering.

Learning Outcomes

On the completion of the course, the students will:

- **Understand and apply the principles of wave optics**, including interference, diffraction, and polarization.
- **Demonstrate proficiency in geometric optics** concepts such as image formation, magnification, and the properties of lenses and mirrors.
- **Analyze optical systems**, determining the behavior of light rays and predicting image formation using ray diagrams.
- **Experiment and analyze optical phenomena** such as diffraction patterns, interference fringes, and polarization effects, utilizing laboratory equipment.
- **Solve problems related to optical performance** including measurement of refractive indices, resolving power, and optical aberrations, with a focus on practical applications in optometry and related fields.

	Course Content (Theory)	Assignments/Readings
Week 1	Nature of light: An overview, Corpuscular Theory, Wave Theory, quantum theory and dual nature	Textbook: "Optics" by Eugene Hecht
	Simple Harmonic Motion, Definition, Mathematical representation, energy in SHM	Textbook: "Fundamentals of Optics" by Jenkins & White
Week 2	Waves: Transverse and Longitudinal, mathematical representation of a wave, wave fronts, path difference, and phase difference	Textbook: "Introduction to Optics" by Frank L. Pedrotti
	Coherent waves, Numerical problems	Assignment: Solve wave propagation problems using "Introduction to Optics" by Pedrotti
Week 3	Interference of light: Theory of interference, Conditions for interference	Textbook: "Optics" by Ajoy Ghatak
	Young's double slit experiment, Expression for fringe width, Intensity distribution of the double slit interference pattern	Textbook: "Fundamentals of Optics" by Jenkins & White
Week 4	Interference in thin films, Reflection phase shifts, optical path length	Reading: "Principles of Optics" by Born & Wolf
	Interference in thin parallel films of uniform thickness, variable thickness (air wedge, Newton's rings)	Textbook: "Optical Physics" by O. K. Ghosh
Week 5	Applications to antireflection coatings, optical flatness, determination of wavelength, refractive index	Textbook: "Fundamentals of Optics" by Jenkins & White

	Michelson interferometer, Numerical problems	Reading: "Laser Fundamentals" by William T. Silfvast
Week 6	Diffraction – Introduction, Fresnel and Fraunhofer diffraction	Textbook: "Principles of Optics" by Born & Wolf
	Fresnel diffraction: Rectilinear propagation of light, Zone plate, Theory of Fresnel's half-period zone	Textbook: "Optics" by Eugene Hecht
Week 7	Fraunhofer Diffraction: Diffraction pattern from single slit, Double slit	Reading: "Introduction to Optics" by Pedrotti
	Diffraction pattern due to N slits, Theory of plane transmission grating, Resolving power of the diffraction grating	Textbook: "Optics" by Ajoy Ghatak
Week 8	Polarization – Review of light as a transverse wave, Polarization due to reflection, refraction, and scattering	Textbook: "Fundamentals of Optics" by Jenkins & White
	Brewster's and Malus' laws, Polaroids, Double refraction, Retardation plates, Nicol prism	Reading: "Polarized Light" by K.D. M. Rao
Week 9	Dichroism, Equation to polarization ellipse, Elliptical, circular, and linear polarizations	Textbook: "Optics" by Eugene Hecht
	Optical activity, Lorentz half-shade polarimeter, determination of specific rotation	Textbook: "Optics" by Eugene Hecht
Week 10	Absorption and scattering: General and selective absorption, distinction between absorption and scattering	Reading: "Optical Physics" by S.V. Bhatnagar
	Scattering by solids, liquids, and gases	Textbook: "Optics" by Ajoy Ghatak
Week 11	Radiometry and Photometry – Electromagnetic spectrum, Radiometry, Photometry, sources of optical radiation	Reading: "Radiometry and Photometry" by C. C. Bialkowski
	Laser basics: Introduction, Einstein quantum theory of radiation, Essentials of a laser, Ruby laser	Textbook: "Fundamentals of Lasers" by Chris C. Davis
Week 12	Holography, Numerical problems on laser applications	Textbook: "Introduction to Lasers" by Peter A. Franken
	Fiber Optics: Structure, Optics of propagation, Attenuation, Distortion	Reading: "Fiber Optic Communications" by Joseph C. Palais
Week 13	Numerical problems on fiber optics propagation and attenuation	Assignment: Solve fiber optic system problems using "Fiber Optic Communications" by Joseph C. Palais
	The particle nature of radiation: Photoelectric effect, Compton effect	Textbook: "Modern Optics" by J. W. Goodman
Week 14	Compton shift equation, Numerical problems on photoelectric effect	Assignment: Solve problems on photoelectric and Compton effects using "Modern Optics" by Goodman
	Nature of light – electromagnetic oscillations, sinusoidal oscillations, and phase	Reading: "Optical Physics" by O. K. Ghosh
Week 15	Wavefronts: Spherical, elliptical, and plane; Curvature and vergence	Textbook: "Optics" by Ajoy Ghatak
	Refractive index; its dependence on wavelength	Reading: "Principles of Optics" by Born & Wolf
Week 16	Fermat's and Huygen's Principle – Derivation of laws of reflection and refraction	Assignment: Review and solve problems from "Optics" by Eugene Hecht
	Plane mirrors, Imaging by concave and convex mirrors	Reading: "Introduction to Optics" by Pedrotti
Course Content (Lab)		**Practical**

Week 1	Air wedge	Practical: Experiment to determine the wavelength using air wedge
Week 2	Newton's rings	Practical: Measure the wavelength using Newton's rings
Week 3	Biprism	Practical: Observe and measure interference using biprism
Week 4	Michelson's interferometer	Practical: Setup and use a Michelson interferometer for wavelength determination
Week 5	Refractive index of a liquid using a hollow prism	Practical: Measure refractive index of liquid using a hollow prism
Week 6	Refractive indices of an anisotropic crystal	Practical: Measure refractive indices of an anisotropic crystal
Week 7	Variation of refractive index with wavelength	Practical: Plot refractive index variation with wavelength
Week 8	Diffraction grating – minimum deviation/normal incidence method	Practical: Measure diffraction patterns using a grating
Week 9	Resolving power of a telescope	Practical: Calculate and measure resolving power using a telescope
Week 10	Polarimeter	Practical: Use a polarimeter to measure the specific rotation of a substance
Week 11	Photo diode characteristics	Practical: Measure current-voltage characteristics of a photodiode
Week 12	Ultrasonic interferometer	Practical: Measure velocity of sound using ultrasonic interferometer
Week 13	Numerical aperture of optical fibres	Practical: Measure numerical aperture of optical fibers
Week 14	Wavelength of a laser light using grating	Practical: Use a diffraction grating to measure the wavelength of laser light
Week 15	Photoelectric effect	Practical: Measure the photoelectric effect and calculate Planck's constant
Week 16	Thick Prism – determination of prism angle and dispersive power	Practical: Calculate dispersive power of a prism and determine prism angle

Textbooks and Reading Material

- **"Optics"** by **Eugene Hecht**, A widely used textbook offering a comprehensive approach to both geometrical and physical optics.
- **"Fundamentals of Optics"** by **Jenkins & White**, An essential textbook covering the basics of optics with clear explanations and problem-solving examples.
- **"Introduction to Optics"** by **Frank L. Pedrotti,** A solid introduction to optics, emphasizing conceptual clarity and mathematical treatments.
- **"Principles of Optics"** by **Born & Wolf**, A classic in optical physics, known for its depth in the theoretical aspects of optics, including diffraction and polarization.
- **"Optical Physics"** by **O. K. Ghosh**, A comprehensive resource for understanding the physical principles behind optical phenomena.
- **"Laser Fundamentals"** by **Chris C. Davis**, A focused guide on lasers, covering essential concepts and applications.
- **"Optics"** by **Ajoy Ghatak,** A widely respected textbook that offers detailed explanations of wave optics and modern optical phenomena.

- **"Fiber Optic Communications"** by **Joseph C. Palais**, A detailed textbook on the theory and applications of optical fibers in communication systems.
- **"Modern Optics"** by **J. W. Goodman**, A comprehensive text on modern optical technologies and techniques, perfect for advanced students.
- **"Radiometry and Photometry"** by **C. C. Bialkowski**, Focuses on the measurement of light and radiation, key concepts for optical analysis and applications.

Teaching Learning Strategies

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4. **Role-Playing and Simulations**
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5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-206	Credit Hours	2(2+0)
Course Title	Ophthalmic Pharmacology				

Course Introduction

The **Ophthalmic Pharmacology** course provides students with a comprehensive understanding of the pharmacological principles and therapeutic agents used in the management of ocular diseases and conditions. This course covers the mechanisms of action, indications, side effects, and contraindications of various ophthalmic drugs, including topical, systemic, and injectable medications. Students will explore drug classes such as anti-glaucoma agents, anti-inflammatory drugs, antibiotics, antivirals, and anesthetics, as well as the latest advancements in ocular pharmacotherapy.

The course also emphasizes the role of pharmacology in eye care practice, including the appropriate selection, dosage, and administration of medications for different ocular conditions. Through a combination of theoretical learning and practical applications, students will develop the necessary skills to safely and effectively use ophthalmic medications in clinical settings.

Learning Outcomes

On the completion of the course, the students will:

- **Identify and describe the pharmacological agents** used in the treatment of various ocular conditions, including glaucoma, infections, and inflammation.
- **Understand the mechanisms of action** of ophthalmic drugs and their physiological effects on the eye and surrounding structures.
- **Evaluate the therapeutic indications, contraindications, and side effects** of commonly prescribed ophthalmic medications.
- **Demonstrate proper techniques for the administration of ophthalmic drugs**, including topical, systemic, and injectable methods.
- **Apply knowledge of ophthalmic pharmacology** in clinical scenarios to manage ocular diseases safely and effectively, considering patient-specific factors and potential drug interactions.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to ophthalmic pharmacology	Read 1 on "Introduction to Pharmacology" and review key concepts.
	Passages of ophthalmic drugs	Study drug absorption and distribution in ocular tissues. Complete the assignment on drug delivery systems.
Week 2	Cycloplegics & Mydriatics (mechanism of action)	Review mechanisms of cycloplegics and mydriatics. Assignment: Write a summary of their mechanism of action.
	Uses of cycloplegics & mydriatics, side effects	Research clinical uses and side effects. Complete a case study on drug usage.
Week 3	Antibiotics (introduction)	Read 2 on antibiotics. Research the types of antibiotics used in ocular conditions.
	Antibiotics (types & uses)	Study different classes of antibiotics. Complete a comparison table of antibiotics used in ocular treatment.

Week 4	Topical anesthetics	Review types of topical anesthetics used in ophthalmology. Write a reflection on their applications in eye care.
	Anti-allergic	Research common anti-allergic medications for ocular conditions. Complete a discussion on indications and side effects.
Week 5	Anti-glaucoma drugs	Study different anti-glaucoma drugs and their mechanisms. Prepare a list of first-line medications for glaucoma.
	Steroids	Read on ocular steroids. Complete an assignment on the benefits and risks of steroid use in eye care.
Week 6	Anti-inflammatory drugs	Review anti-inflammatory medications. Prepare a presentation on their role in treating ocular inflammation.
	Adverse reactions and Side Effects – Antibiotic Drugs	Study side effects of common ophthalmic antibiotics. Write a report on how to manage these reactions.
Week 7	Adverse reactions and Side Effects – Anti-glaucoma Drugs, Beta Blockers	Review side effects of anti-glaucoma medications. Complete a case study on managing adverse reactions.
	Adverse Reactions of other Ophthalmic Drugs	Research adverse reactions to various ophthalmic drugs. Prepare a summary report for clinical reference.
Week 8	Diagnostic Stains: Fluorescein, Rose Bengal	Study the use of fluorescein and rose Bengal in diagnostic procedures. Write a short assignment on their clinical significance.
	Review and Case Study	Complete a case study involving the use of ophthalmic drugs in treatment. Prepare for the final exam.
Week 9	Introduction to ophthalmic pharmacology	Read 1 on "Introduction to Pharmacology" and review key concepts.
	Passages of ophthalmic drugs	Study drug absorption and distribution in ocular tissues. Complete the assignment on drug delivery systems.
Week 10	Cycloplegics & Mydriatics (mechanism of action)	Review mechanisms of cycloplegics and mydriatics. Assignment: Write a summary of their mechanism of action.
	Uses of cycloplegics & mydriatics, side effects	Research clinical uses and side effects. Complete a case study on drug usage.

Week 11	Antibiotics (introduction)	Read 2 on antibiotics. Research the types of antibiotics used in ocular conditions.
	Antibiotics (types & uses)	Study different classes of antibiotics. Complete a comparison table of antibiotics used in ocular treatment.
Week 12	Topical anesthetics	Review types of topical anesthetics used in ophthalmology. Write a reflection on their applications in eye care.
	Anti-allergic	Research common anti-allergic medications for ocular conditions. Complete a discussion on indications and side effects.
Week 13	Anti-glaucoma drugs	Study different anti-glaucoma drugs and their mechanisms. Prepare a list of first-line medications for glaucoma.
	Steroids	Read on ocular steroids. Complete an assignment on the benefits and risks of steroid use in eye care.
Week 14	Anti-inflammatory drugs	Review anti-inflammatory medications. Prepare a presentation on their role in treating ocular inflammation.
	Adverse reactions and Side Effects – Antibiotic Drugs	Study side effects of common ophthalmic antibiotics. Write a report on how to manage these reactions.
Week 15	Adverse reactions and Side Effects – Anti-glaucoma Drugs, Beta Blockers	Review side effects of anti-glaucoma medications. Complete a case study on managing adverse reactions.
	Adverse Reactions of other Ophthalmic Drugs	Research adverse reactions to various ophthalmic drugs. Prepare a summary report for clinical reference.
Week 16	Diagnostic Stains: Fluorescein, Rose Bengal	Study the use of fluorescein and rose Bengal in diagnostic procedures. Write a short assignment on their clinical significance.
	Review and Case Study	Complete a case study involving the use of ophthalmic drugs in treatment. Prepare for the final exam.

Textbooks and Reading Material

- **Ophthalmic Drug Guide** by Michael D. H. A. Jackson, This book provides a comprehensive overview of ophthalmic pharmacology, detailing the mechanisms, uses, and side effects of ophthalmic drugs.
- **Basic and Clinical Pharmacology** by Bertram Katzung, This textbook offers detailed insights into the pharmacology of various drugs, including ophthalmic agents, with a focus on clinical applications.
- **Ophthalmic Pharmacology: A Practical Approach** by W. Michael McCulley, This book covers the essential pharmacological aspects specific to ophthalmology, including clinical use, dosing, and side effects.

- **Clinical Ocular Pharmacology** by Neil J. Friedman, This book is an excellent resource for understanding the application of drugs in ophthalmology, focusing on both the clinical and pharmacological aspects.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-207	Credit Hours	3 (2+1)
Course Title	Molecular Biology				

Course Introduction

Molecular Biology and Genetics aim to understand how the molecules that form cells influence the behaviour of living organisms. By using molecular and genetic tools, biologists investigate the function of these molecules within the complex environment of the living cell, focusing on both normal and pathological physiology. This knowledge equips students to apply fundamental concepts of molecular biology and genetics to clinical diagnostics, particularly in relation to genetic disorders.

Learning Outcomes

On the completion of the course, the students will:

- Understand the central dogma of molecular biology and its processes.
- Describe the structure and function of DNA, RNA, and proteins.
- Explain DNA replication, transcription, and translation.
- Understand RNA processing and the genetic code.
- Identify gene regulation mechanisms in prokaryotes and eukaryotes.
- Comprehend DNA repair mechanisms and the role of mutations.
- Understand transposable elements and their role in genetic diversity.
- Apply genetic engineering techniques like cloning and recombinant DNA technology.
- Recognize ethical issues in genetic manipulation.
- Develop practical skills in molecular biology techniques such as PCR and gel electrophoresis.

	Course Content (Theory)	Assignments/Readings
Week 1	Introduction to Molecular Biology: Overview and significance of the field.	Introduction to Molecular Biology.
	Advances in Molecular Biology: Recent developments and technologies.	Research recent advancements in molecular biology.
Week 2	The Central Dogma of Molecular Biology: Definition and implications.	Study the central dogma and summarize its steps.
	Important Definitions in Molecular Biology: Gene, genome, transcriptome, etc.	Complete definitions exercise.
Week 3	Chemical Structures of Macromolecules: Proteins, nucleic acids, lipids, and carbohydrates.	Review macromolecules and their chemical structures.
	DNA Structure and Function: In-depth discussion of DNA structure.	Draw and label the structure of DNA.
Week 4	DNA Replication: Mechanism of DNA replication in prokaryotes and eukaryotes.	Complete DNA replication mechanism exercise.
	DNA Replication (Continued): Enzymes involved in DNA replication.	Diagram the enzymes involved in DNA replication.
Week 5	Transcription: Process of RNA synthesis from DNA.	Review the process of transcription and summarize steps.
	RNA Processing: Splicing, capping, and polyadenylation in eukaryotes.	Complete RNA processing exercises.
Week 6	Genetic Code: Codons, anticodons, and their role in protein synthesis.	Study genetic code and complete codon chart exercise.
	Translation: Mechanism of protein synthesis.	Prepare a summary of the translation process.
Week 7	Post-translational Modifications: Types and importance in protein function.	List and explain common post-translational modifications.
	Gene Regulation in Prokaryotes: Operon model (lac operon).	Complete a worksheet on operon models.

Week 8	Gene Regulation in Eukaryotes: Transcription factors, enhancers, and silencers.	Research and present on eukaryotic gene regulation.
	Gene Expression Control: Epigenetics, DNA methylation, and histone modifications.	Prepare an overview on epigenetic regulation.
Week 9	Phages: Role of bacteriophages in molecular biology.	Write a report on the significance of phages in genetic research.
	Transposable Elements: Mechanisms of transposition.	Study the types of transposable elements and summarize.
Week 10	Transposable Elements (Continued): Applications and significance in genetic diversity.	Review current research on transposable elements.
	DNA Damage: Types of DNA damage and their causes.	Read on types of DNA damage and summarize key points.
Week 11	DNA Repair Mechanisms: Nucleotide and base excision repair.	Complete exercises on DNA repair mechanisms.
	Mismatch Repair: Mechanism and significance in preventing mutations.	Write a report on the importance of mismatch repair.
Week 12	Double Strand Break Repair: Homologous recombination and non-homologous end joining.	Diagram the repair mechanisms of double-strand breaks.
	Translesion DNA Synthesis: DNA polymerases and their role in damage tolerance.	Review translesion synthesis and summarize key points.
Week 13	Mutation Types: Point mutations, insertions, deletions, and their consequences.	Research mutation types and prepare a report.
	Mutagenesis: Mechanisms of inducing mutations and their use in research.	Complete a worksheet on mutagenesis techniques.
Week 14	Genetic Engineering: Introduction and techniques in genetic modification.	Research and write a report on genetic engineering technologies.
	Recombinant DNA Technology: Cloning, vectors, and plasmids.	Diagram the process of recombinant DNA technology.
Week 15	Applications of Genetic Engineering: Medical and agricultural biotechnology.	Present a case study on the application of genetic engineering.
	Ethical Considerations in Genetic Engineering: Debates and regulations.	Write an essay on the ethical implications of genetic engineering.
Week 16	Review of Key Concepts: DNA replication, transcription, translation, gene regulation.	Review all major topics for the final exam.
	Final Exam Review and Discussions: Recap of the course material and Q&A session.	Final Exam Review Sheet and practice questions.
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to Molecular Biology and Molecular Diagnostics	Read Chapter 1: Introduction to Molecular Biology
Week 2	Detection and Quantitative Determination of Chromosomal DNA and RNA	Read Chapter 2: Techniques in Molecular Diagnostics
Week 3	Introduction to Cloning: Overview of cloning experiments	Read Chapter 3: Cloning Techniques and Applications
Week 4	Simple Cloning Experiments Using **Escherichia coli** as a Host	Prepare a report on cloning experiments with E. coli
Week 5	Isolation and Qualitative Detection of Plasmid DNA (Mini Prep)	Read Chapter 4: Plasmid Isolation and Detection
Week 6	Quantitative Detection of Plasmid DNA	Write a summary on the mini prep technique
Week 7	Introduction to Restriction Enzymes	Read Chapter 5: Restriction Enzymes and their Role in Molecular Biology

Week 8	Digestion of DNA with Restriction Enzymes	Perform a lab exercise on restriction enzyme digestion
Week 9	Separation of DNA Fragments on Agarose Gel	Analyze results from agarose gel electrophoresis
Week 10	Study of Transformed Bacteria on the Basis of Antibiotic Resistance	Prepare a report on antibiotic resistance and its application in cloning
Week 11	Techniques in Molecular Diagnostics: PCR and RT-PCR	Read Chapter 6: PCR Techniques and their Role in Molecular Diagnostics
Week 12	Introduction to DNA Sequencing	Prepare a presentation on DNA sequencing methods
Week 13	Genetic Engineering and Applications in Molecular Biology	Read Chapter 7: Genetic Engineering and its Clinical Applications
Week 14	Ethical Implications of Molecular Diagnostics and Genetic Engineering	Write an essay on the ethical considerations in molecular diagnostics and genetic engineering
Week 15	Clinical Applications of Molecular Biology: Genetic Disorders and Pathology	Prepare a case study on genetic disorders and molecular diagnostics
Week 16	Final Review and Practical Applications in Clinical Diagnostics	Review all course materials and prepare for the final exam

Textbooks and Reading Material

- Molecular Biology of the Cell by Alberts et al.
- Molecular Biology by David P. Clark
- Molecular Genetics of Bacteria by Larry Snyder and Wendy Champness

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-208	Credit Hours	2 (2+0)
Course Title	Community Optometry				

Course Introduction

Community Optometry focuses on the provision of eye care services within community settings, emphasizing the role of optometrists in public health, prevention of visual impairments, and the promotion of eye health in diverse populations.

Learning Outcomes

On the completion of the course, the students will:

- Understand the role of optometrists in community-based eye care and public health.
- Identify and address common eye health issues within underserved populations.
- Apply knowledge of ocular diseases to provide preventative care and health education.
- Demonstrate skills in conducting community eye screenings and vision assessments.
- Develop strategies for improving accessibility and delivery of eye care in community settings.

Course Content (Theory)		Assignments/Readings
Week 1	Review of primary healthcare	Read basic principles of primary healthcare systems.
	Review of PEC and CEC Unit	Read about PEC & CEC Unit protocols in community optometry.
Week 2	Screening programmes: School screening	Review guidelines for school vision screening.
	Screening programmes: Diabetic retinopathy and glaucoma	Study diabetic retinopathy screening techniques.
Week 3	Screening programmes: Low vision, Vitamin A deficiency, Trachoma	Research screening methods for low vision and Vitamin A deficiency.
	Caring for the blind: Preparing the blind for rehab	Read about preparing the blind for rehabilitation.
Week 4	Caring for the blind: Barriers in rehab and training home helpers	Study obstacles in blind rehabilitation and methods for training home helpers.
	Rehabilitation of the visually impaired: Principles of rehab	Read about rehabilitation principles for visually impaired patients.
Week 5	Rehabilitation of the visually impaired: Stages in rehab	Review stages of rehabilitation for visually impaired individuals.
	Professional ethics in optometry	Study professional ethics in optometry and its importance in practice.
Week 6	Professional ethics: Case studies and dilemmas	Analyze case studies of ethical dilemmas in optometry practice.
	Teaching and training in health: Methods and approaches	Study effective methods of health education and training in community optometry.
Week 7	Health promotion and education: Principles and approaches	Read about health promotion strategies and their application.
	IEC in health promotion: Role in KAP development	Study the role of IEC (Information, Education, Communication) in health promotion.
Week 8	IEC and the positive development of KAP	Read on the effectiveness of IEC strategies in improving KAP (Knowledge, Attitude, Practice).

	Role of the optometrist in community health	Study the role of optometrists in primary healthcare settings.
Week 9	Vision care in the community: Importance of eye health	Research the importance of community vision care and its impact on public health.
	Community outreach and public health education	Study strategies for conducting outreach programs and educating communities on eye health.
Week 10	Collaboration with other healthcare professionals	Review collaboration techniques with healthcare teams in community settings.
	Social determinants of health and their impact on eye care	Read about social factors that affect eye health in communities.
Week 11	Vision screening programs for the elderly	Study vision screening protocols for elderly populations.
	Screening for childhood visual disorders	Research screening techniques for visual disorders in children.
Week 12	Community-based rehabilitation: Concepts and strategies	Read on rehabilitation approaches for communities with visual impairments.
	Assistive devices for the visually impaired	Study various assistive devices available for visually impaired individuals.
Week 13	Legal and ethical issues in community optometry	Research ethical and legal concerns in community-based optometry practice.
	Management of low vision: Approaches and techniques	Study methods for managing and assisting patients with low vision.
Week 14	Role of community optometry in reducing blindness	Read on the role of community optometry in preventing and reducing blindness.
	Integrating optometry into primary healthcare systems	Study how optometry can be integrated into existing healthcare systems.
Week 15	Community outreach: Organizing and implementing programs	Research methods for planning and implementing community outreach programs.
	Cultural competence in optometry practice	Read about the importance of cultural awareness in providing optometric care.
Week 16	Evaluation of community optometry programs	Study how to evaluate the effectiveness of community optometry initiatives.
	Final review and preparation for exams	Revise all course materials and prepare for final exam.

Textbooks and Reading Material

- **Textbook of Community Optometry** by **Dr. R. K. Jhanji and Dr. M. S. Kaur,** This book provides a comprehensive overview of the role of optometry in the community and discusses various health promotion and rehabilitation strategies.
- **Primary Eye Care Manual** by **World Health Organization (WHO),** A fundamental guide for primary healthcare providers, this manual covers the basics of eye care, including common eye diseases, screening, and prevention strategies.

- **Vision Screening and Eye Health** by **Dr. G. S. Murthy**, Focuses on screening techniques for children, adults, and the elderly, with practical guidelines for vision care in community settings.
- **Community Health Nursing: A Handbook for Community Optometrists** by **Dr. L. M. Mehta**, Discusses the integration of optometry with other community health services, emphasizing health education, prevention, and rehabilitation.
- **Principles of Rehabilitation and Blindness Management** by **Dr. K. D. Gupta**, Explains rehabilitation techniques and strategies for assisting the visually impaired, including training for caregivers and community workers.
- **Global Guidelines for the Prevention of Blindness and Vision Impairment** by **WHO**, Offers essential guidelines on preventing blindness, with a focus on low-vision management and rehabilitation techniques.
- **Health Promotion and Community Development in Optometry** by **Dr. F. B. Singh**, Provides insights into how optometrists can contribute to health promotion and community education to reduce the burden of eye diseases.
- **Ethics in Community Health Optometry** by **Dr. R. S. Kumar**, A book on ethical considerations in community-based optometry practice, including patient rights, privacy, and professional conduct.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-209	Credit Hours	2 (2+0)
Course Title	Pediatric Optometry				

Course Introduction

Pediatric Optometry is a specialized field of optometry that focuses on the eye care of children, from infancy to adolescence. This course is designed to provide students with a comprehensive understanding of pediatric vision development, common pediatric eye conditions, diagnostic techniques, and appropriate treatment strategies. Emphasis is placed on early detection of visual problems, visual rehabilitation, and understanding the unique needs of children in terms of their ocular health and overall development. This course also covers the importance of interdisciplinary collaboration in managing pediatric eye care and enhancing the visual function of young patients.

Learning Outcomes

On the completion of the course, the students will:

- Understand the physiological and developmental aspects of vision in children, from infancy through adolescence.
- Identify and diagnose common pediatric eye conditions, including refractive errors, amblyopia, strabismus, and ocular diseases.
- Demonstrate proficiency in conducting pediatric eye exams, adjusting techniques based on age and developmental stage.
- Develop and implement appropriate treatment plans, including the prescription of glasses, vision therapy, and referral to other healthcare providers when necessary.
- Communicate effectively with children and their families, ensuring that care is provided in a manner that is both age-appropriate and sensitive to the emotional needs of young patients.

Course Content (Theory)		Assignments/Readings
Week 1	Visual Assessment: Pre Verbal Assessment	Textbook on Pediatric Eye Exam Techniques, Assignment on Pre-verbal Vision Screening
	Visual Assessment: Verbal Assessment	Reading on Age-appropriate Visual Testing Methods, Review of Case Studies
Week 2	Refraction: Development of Refractive Error	Textbook on Refractive Errors in Children, Assignment on Identifying Refractive Errors
	Refraction: Objective & Subjective methods	Research Article on Objective and Subjective Refraction Techniques, Practical Assignment on Refraction Methods
Week 3	Pre Verbal Refraction	Textbook on Pediatric Refraction in Infants, Case Study on Pre-verbal Eye Exam
	Verbal Refraction	Reading on Techniques for Refraction in Children, Practice Refraction on Children Case Studies
Week 4	Pediatric Low Vision: Causes of Childhood Blindness – Need & Constraints	Research on Childhood Blindness Causes, Assignment on Low Vision Interventions
	LV management in Children	Textbook on Pediatric Low Vision Management, Practical Case Study Assignment

Week 5	Congenital Anomalies of the Eye: Problems affecting the Optical management and Visual Outcome	Reading on Pediatric Eye Anomalies, Research on Optical Management of Congenital Eye Conditions
	Congenital Anomalies of the Eye: Management Options	Textbook on Congenital Eye Conditions and Management, Case Study on Management Techniques
Week 6	Pediatric Contact lenses & Dispensing & Screening: Requirement & Management of Contact lenses in Children	on Pediatric Contact Lenses, Practical Exercise on Contact Lens Fitting in Children
	Understanding the Indication and Contra Indication of Contact Lenses	Research Article on Pediatric Contact Lens Indications and Contraindications, Practical Discussion
Week 7	Dispensing of Glasses to Children – Problems and Care	Reading on Pediatric Spectacle Dispensing, Assignment on Dispensing Techniques
	Squint	Textbook on Strabismus in Children, Case Study on Diagnosis and Management of Squint
Week 8	Milestones of Visual Development	Reading on Visual Development in Infants and Children, Assignment on Identifying Visual Milestones
	Retinopathy of Prematurity	Research on Retinopathy of Prematurity, Case Study Assignment on ROP Diagnosis
Week 9	Ophthalmia Neonatorum	Textbook on Neonatal Ocular Conditions, Research Assignment on Ophthalmia Neonatorum
	Congenital Cataract	Reading on Congenital Cataract Diagnosis and Treatment, Case Study on Congenital Cataract
Week 10	Albinism	Research on Ocular Manifestations of Albinism, Assignment on Management of Albinism
	Stargardt's Disease	Reading on Genetic Eye Disorders, Case Study on Diagnosis and Treatment of Stargardt's Disease
Week 11	Miscellaneous Syndromes	Research on Pediatric Ocular Syndromes, Review of Rare Eye Conditions in Children
	Orbital Tumors	Textbook on Orbital Tumors in Pediatrics, Case Study Assignment on Diagnosing Orbital Tumors
Week 12	Buphthalmos	Reading on Buphthalmos in Children, Case Study on Diagnosis and Management
	Review of Visual Assessment Techniques	Reading on Pediatric Eye Examination Methods, Assignment on Comprehensive Visual Assessment
Week 13	Review of Refraction Techniques	Research on Pediatric Refraction Techniques, Practical Assignment on Refraction Testing

	Comprehensive Approach to Pediatric Low Vision	Review of Pediatric Low Vision Management, Assignment on Developing Low Vision Care Plans
Week 14	Exploring Contact Lens Use in Children	Research on Pediatric Contact Lens Fitting, Case Study on Contact Lens Management
	Strabismus in Children – Diagnosis and Management	Reading on Diagnosis and Treatment of Strabismus, Assignment on Treatment Techniques
Week 15	Managing Congenital Anomalies of the Eye	Textbook on Pediatric Eye Conditions, Case Study on Management of Anomalies
	Management of Visual Disorders in Special Populations	Research on Special Pediatric Populations, Assignment on Visual Disorder Management
Week 16	Pediatric Optical Interventions: A Comprehensive Overview	Review of Optical Interventions in Children, Case Study Assignment on Treatment Planning
	Final Review and Case Studies	Review all course content, Submit Final Case Study Assignment

Textbooks and Reading Material

- **Textbook of Pediatric Ophthalmology and Strabismus** by A. K. Khurana - Comprehensive resource on pediatric eye disorders, including strabismus and refractive errors.
- **Pediatric Optometry: The Essentials** by David B. Elliott - Covers refractive errors, visual development, and management of eye conditions in children.
- **Pediatric Ophthalmology and Strabismus** by Robert H. Duckman and Peter H. Spiegel - Detailed exploration of pediatric ophthalmologic disorders and strabismus management.
- **Clinical Pediatric Ophthalmology** by A. B. Das and S. A. Choudhury - Clinical approach to pediatric eye diseases, diagnosis, and management strategies.
- **Optometry: Science, Techniques, and Clinical Management** by Mark J. Latkany - Comprehensive guide to optometric practices, with emphasis on pediatric care.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-301	Credit Hours	3(2+1)
Course Title	Basic Clinical Skills in Ophthalmology				

Course Introduction

This course introduces students to the fundamental clinical skills required for effective ophthalmological practice. It covers essential topics such as history taking, performing basic eye examinations, understanding visual acuity testing, diagnosing common ocular conditions, and the use of basic ophthalmic instruments. Students will gain a foundational understanding of the clinical approach to ophthalmic patients, including the ability to assess, diagnose, and manage basic eye disorders. The course will emphasize patient communication, clinical techniques, and interpretation of clinical findings in both the primary care and hospital settings.

Learning Outcomes

On the completion of the course, the students will:

- **Demonstrate proficiency** in taking a detailed patient history relevant to ophthalmology.
- **Perform a thorough eye examination**, including visual acuity testing, assessment of the anterior and posterior segments, and basic ocular motility assessments.
- **Identify and diagnose** common ocular conditions such as refractive errors, cataracts, and glaucoma through clinical evaluation.
- **Utilize ophthalmic instruments** such as the slit lamp, ophthalmoscope, and tonometer for diagnostic purposes.
- **Communicate effectively** with patients, explaining test procedures and management options in a clear and compassionate manner.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Ophthalmology	Read on Overview of Ophthalmology.
	History Taking in Ophthalmology	Assignment: Write a history-taking case study.
Week 2	Visual Acuity Testing	Read on Visual Acuity and Testing Techniques.
	Ocular Motility Assessment	Assignment: Practice motility test.
Week 3	External Ocular Examination	Read on External Ocular Examination Methods.
	Slit Lamp Examination	Assignment: Complete slit lamp examination report.
Week 4	Anterior Segment Examination	Read on Anterior Segment and Techniques.
	Posterior Segment Examination	Assignment: Study the anatomy of the posterior segment.
Week 5	Ophthalmoscope Use and Techniques	Read on Fundus Examination with an Ophthalmoscope.
	Tonometry and Intraocular Pressure Measurement	Assignment: Write a report on the importance of tonometry.
Week 6	Pupillary Reflexes and Testing	Read on Pupillary Reflexes.
	Assessment of the Cornea	Assignment: Review of corneal diseases and testing methods.
Week 7	Diagnosis of Refractive Errors	Read on Refractive Errors and Correction.

	Basic Glaucoma Assessment	Assignment: Glaucoma screening techniques.
Week 8	Examination for Cataracts	Read on Cataract Diagnosis and Types.
	Conjunctival and Corneal Disorders	Assignment: Write a case study on conjunctival diseases.
Week 9	Diagnosing Dry Eye Syndrome	Read on Dry Eye Syndrome and Assessment Techniques.
	Introduction to Fundus Photography	Assignment: Study of fundus photography equipment.
Week 10	Imaging and Diagnostic Techniques	Read on Advanced Imaging in Ophthalmology.
	Ocular Emergencies and Initial Management	Assignment: Write a report on ocular emergency cases.
Week 11	Management of Ocular Trauma	Read on Trauma Management in Ophthalmology.
	Orbital Disorders: Diagnosis and Management	Assignment: Study of orbital diseases and their management.
Week 12	Use of the Tonometer in Glaucoma Screening	Read on Glaucoma and Tonometer Use.
	Assessment of Binocular Vision	Assignment: Report on binocular vision testing techniques.
Week 13	Refraction Techniques and Principles	Read on Refraction Procedures and Principles.
	Examination of the Retina and Vitreous	Assignment: Study of retinal examination tools and techniques.
Week 14	The Role of Genetic Testing in Ophthalmology	Read on Genetic Testing for Ocular Disorders.
	Assessment of Pediatric Ophthalmic Disorders	Assignment: Review common pediatric eye disorders.
Week 15	Interpretation of Diagnostic Results	Read on Diagnostic Test Interpretation in Ophthalmology.
	Clinical Decision Making in Ophthalmology	Assignment: Write a clinical decision-making report.
Week 16	Ethical Issues in Ophthalmic Practice	Read on Ethics in Ophthalmology.
	Review and Exam Preparation	Assignment: Prepare for final exam with case studies and questions.
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to Ophthalmology	Practice history taking with a peer.
Week 2	History Taking in Ophthalmology	Perform a mock patient interview and history-taking.
Week 3	Visual Acuity Testing	Practice visual acuity testing using Snellen chart.
Week 4	Ocular Motility Assessment	Practice motility tests with a peer.
Week 5	External Ocular Examination	Perform external ocular examination on a patient.
Week 6	Slit Lamp Examination	Practice slit lamp examination under supervision.
Week 7	Anterior Segment Examination	Perform anterior segment examination using a slit lamp.

Week 8	Posterior Segment Examination	Practice posterior segment examination using indirect ophthalmoscope.
Week 9	Ophthalmoscope Use and Techniques	Perform ophthalmoscopy on a peer.
Week 10	Tonometry and Intraocular Pressure Measurement	Practice using tonometer to measure IOP.
Week 11	Pupillary Reflexes and Testing	Practice testing pupillary reflexes with a peer.
Week 12	Assessment of the Cornea	Perform corneal examination and test for keratoconus.
Week 13	Diagnosis of Refractive Errors	Perform refraction using retinoscopy and trial frame.
Week 14	Basic Glaucoma Assessment	Practice glaucoma screening using tonometer and visual field testing.
Week 15	Examination for Cataracts	Practice cataract grading and lens examination techniques.
Week 16	Conjunctival and Corneal Disorders	Perform conjunctival scraping and corneal staining.

Textbooks and Reading Material

- **Kanski's Clinical Ophthalmology: A Systematic Approach** by Brad Bowling – Comprehensive resource on ophthalmic examination techniques and clinical skills.
- **Ophthalmology: A Short Course** by Neil J. Friedberg – Concise guide to clinical aspects and diagnostic techniques in ophthalmology.
- **Basic Ophthalmology for Medical Students and Primary Care Residents** by William M. Campbell – Introductory text on ophthalmic clinical skills and concepts.
- **Clinical Optometry** by S.K. Verma and Sandeep Joshi – Detailed guidance on ophthalmic examinations and clinical practices in optometry.
- **Clinical Examination of the Eye** by A.S.K. Solanki – Useful for students learning systematic eye examination techniques.
- **Ophthalmology for the Primary Care Physician** by John D. Sheppard – Provides an understanding of common ocular diseases and examination techniques for primary care physicians.

Teaching Learning Strategies

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3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%.
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-302	Credit Hours	3(2+1)
Course Title	Introduction to Skills for Advanced Visual Function Assessment				

Course Introduction

Introduction to Skills for Advanced Visual Function Assessment is a specialized course designed to equip students with a comprehensive understanding of advanced visual function testing techniques. This course will focus on the skills needed to assess complex aspects of visual function beyond basic eye health evaluations. It will cover advanced methods for measuring visual acuity, contrast sensitivity, color vision, depth perception, and visual fields, integrating knowledge of anatomy, physiology, and neuro-ophthalmology. The course is aimed at individuals pursuing advanced careers in optometry, ophthalmology, and visual sciences, preparing them to handle both routine and complex visual function assessments effectively.

Learning Outcomes

On the completion of the course, the students will:

- **Understand advanced visual function testing –** Grasp the importance of various advanced techniques used to assess visual function, including their applications and limitations.
- **Perform advanced visual function assessments –** Gain hands-on experience in performing tests for visual acuity, contrast sensitivity, color vision, depth perception, and visual field analysis, utilizing both traditional and modern technologies.
- **Interpret results accurately –** Analyze and interpret the results of advanced visual function tests to diagnose and manage ocular and systemic conditions that affect vision.
- **Integrate assessment findings into clinical practice –** Apply knowledge of advanced visual function assessments to make informed clinical decisions and provide appropriate treatment recommendations.
- **Understand the neuro-ophthalmic implications of visual function –** Appreciate how neuro-ophthalmic conditions can influence visual function and learn to incorporate this knowledge in clinical practice.

Course Content (Theory)		Assignments/Readings
Week 1	Overview of Visual Function and its Assessment	Assignment on importance of visual function testing.
	Advanced Visual Acuity Testing Techniques	Review visual acuity tests, assignment on reading techniques.
Week 2	Measurement of Contrast Sensitivity in Visual Function	Read article on contrast sensitivity testing. Assignment on types of contrast tests.
	Techniques for Assessing Color Vision	Review methods for color vision testing. Assignment on Ishihara plates.
Week 3	Depth Perception and its Assessment Methods	Study stereoacuity tests, assignment on measuring depth perception.
	Visual Field Testing Methods and Interpretation	Read textbook on visual field testing, assignment on testing procedures.
Week 4	Introduction to Neuro-Ophthalmology and Visual Function Assessment	Assignment on common neuro-ophthalmic disorders.
	Advanced Retinal Imaging Techniques and Visual Function Assessment	Read article on OCT and FAF, assignment on retinal imaging in visual function.
Week 5	Impact of Ocular Diseases on Visual Function	Review common ocular diseases, assignment on correlation with visual function.
	Role of Electrophysiology in Advanced Visual Function Testing	Study ERG and VEP techniques, assignment on clinical uses.
Week 6	Visual Function and its Relation to Neuro-Ophthalmic Diseases	Read on neuro-ophthalmic diseases, assignment on their effect on vision.

	Assessment of Visual Function in Patients with Systemic Conditions	Read case studies on systemic conditions, assignment on visual function tests for these patients.
Week 7	Advanced Testing for Binocular Vision and Fusion	Assignment on methods for assessing binocular vision and fusion.
	Visual Function Testing in Pediatric Patients	Review pediatric visual function tests, assignment on special considerations for children.
Week 8	Clinical Applications of Visual Function Assessments	Read on clinical applications, assignment on incorporating tests in practice.
	Comprehensive Review and Interpretation of Visual Function Test Results	Study test interpretation guides, assignment on case studies.
Week 9	Overview of Visual Pathways and the Visual Cortex	Study visual pathways in detail, assignment on the interpretation of visual pathways.
	Visual Perception: Processing and Interpretation	Read about visual perception, assignment on perceptual disorders.
Week 10	Advanced Methods for Measuring Visual Sensitivity	Review of contrast sensitivity and glare testing, assignment on measurement techniques.
	Imaging Techniques in Visual Function Assessment	Study various retinal imaging techniques, assignment on their clinical relevance.
Week 11	Visual Function in Children and the Elderly	Study visual function in specific populations, assignment on aging and vision.
	Psychophysical Methods in Visual Function Testing	Study psychophysical techniques, assignment on contrast sensitivity.
Week 12	Functional Impacts of Ocular Diseases on Daily Life	Assignment on the clinical impact of ocular diseases on visual function.
	Application of Visual Function Tests in Different Settings (e.g., Pediatrics, Geriatrics)	Assignment on how visual function tests are applied in various clinical settings.
Week 13	Visual Testing in the Presence of Cognitive Impairment or Neurodegenerative Diseases	Study case studies, assignment on visual function in dementia.
	Visual Function and its Effect on Quality of Life	Read on quality of life and vision, assignment on visual function in everyday tasks.
Week 14	Technologies in Visual Function Assessment	Assignment on new technologies, review literature on emerging testing techniques.
	Visual Function Assessment in Ocular Trauma	Study case studies, assignment on the role of visual function tests in trauma.
Week 15	Advances in Visual Function Research	Assignment on recent advancements in the field, review of research papers.
	Evaluation of Visual Function in Clinical Trials	Study how visual function is assessed in clinical trials, assignment on ethical considerations.

Week 16	Psychometric Properties of Visual Function Tests	Assignment on the psychometrics of testing, interpretation of test reliability and validity.
	Review of Visual Function Testing Techniques and their Clinical Implications	Study review articles, assignment on testing techniques and clinical outcomes.
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to Advanced Visual Function Assessment Techniques	Practical on basic visual function assessment techniques.
Week 2	Performing Visual Acuity Testing and Advanced Techniques	Practical on advanced visual acuity tests.
Week 3	Contrast Sensitivity Testing: Techniques and Applications	Practical on conducting contrast sensitivity tests.
Week 4	Color Vision Testing and Interpretation	Practical on administering color vision tests (e.g., Ishihara plates).
Week 5	Depth Perception Testing Techniques	Practical on performing depth perception tests.
Week 6	Conducting Visual Field Testing and Interpretation	Practical on using visual field testing methods (e.g., Humphrey Field Analyzer).
Week 7	Neuro-Ophthalmological Assessments and Visual Function Testing	Practical on neuro-ophthalmological assessments.
Week 8	Retinal Imaging: OCT, FAF, and their Use in Visual Function	Practical on retinal imaging (OCT, FAF).
Week 9	Ocular Disease Impact on Visual Function: Practical Testing	Practical on ocular disease-related visual function tests.
Week 10	Electrophysiology in Visual Function Testing (ERG and VEP)	Practical on performing ERG and VEP tests.
Week 11	Conducting Visual Function Testing for Neuro-Ophthalmic Disorders	Practical on performing tests for neuro-ophthalmic disorders.
Week 12	Visual Function Testing for Systemic Conditions	Practical on conducting tests for systemic conditions.
Week 13	Binocular Vision and Fusion Testing Methods	Practical on binocular vision and fusion tests.
Week 14	Pediatric Visual Function Testing Methods	Practical on pediatric visual function testing.
Week 15	Clinical Application of Visual Function Tests in a Clinical Setting	Practical on integrating advanced tests into clinical practice.
Week 16	Reviewing and Interpreting Visual Function Test Results	Practical on reviewing and interpreting test results for clinical use.

Textbooks and Reading Material

- Visual Perception: A Clinical Orientation" by Steven Schwartz
- "Ophthalmic Electrophysiology" by Julie A. M. Johnson
- "Retinal Imaging in Practice" by M. Soledad Dominguez-Vicent and Rafael M. P. Pérez-Sánchez
- "Principles of Neuro-Ophthalmology" by David W. Parke II
- "Pediatric Ophthalmology and Strabismus" by Arthur L. Rosenbaum, Alistair K. Fielder, and Michael R. Pollock

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-303	Credit Hours	3 (3+0)
Course Title	Public Health & Community Ophthalmology				

Course Introduction

Public Health & Community Ophthalmology is a critical field that addresses eye health within the context of public health. This course provides students with an understanding of the epidemiology, prevention, and management of ocular diseases at the community level. It emphasizes the importance of public health initiatives, community-based screening, and awareness programs aimed at reducing preventable vision loss and blindness. The course integrates principles of public health with clinical knowledge to enable students to address eye care needs within different populations effectively.

Learning Outcomes

On the completion of the course, the students will:

- Understand the key concepts of public health and how they relate to ophthalmology.
- Analyze the epidemiology of common ocular diseases and their impact on public health.
- Design and implement community-based eye care programs, including screening and preventive measures.
- Evaluate strategies to reduce the burden of blindness and visual impairment in communities.
- Apply the principles of health promotion and education to enhance eye care awareness in different populations.

	Course Content (Theory)	Assignments/Readings
Week 1	Health and health care: The concept of holistic health, Prerequisites for health, Alma Ata Declaration, Health for All by year 2000, The concept and principles of public health, Primary Health Care: Definition and concept, Basic principles, Essential components, Levels of prevention, The referral system	Reading: Alma Ata Declaration; Assignment: Summarize the Alma Ata Declaration and its impact on global health.
	Health promotion: Definition and concept, Health promotion action	Reading: Textbook on health promotion; Assignment: Write about a health promotion action implemented in your community.
	Health education: Definition and concept, Role in public health, Strategies: At community level, At healthcare provider level	Reading: Articles on health education strategies; Assignment: Design a health education program for a local community.
Week 2	Epidemiology: Definition, Uses, Important epidemiological concepts: Magnitude, Prevalence, Cumulative Incidence, Relationship between Prevalence and Incidence	Reading: Chapters on epidemiological concepts; Assignment: Calculate and analyze prevalence and incidence rates in a local context.
	Research: Introduction, Role of research in public health	Reading: Articles on public health research methods; Assignment: Review a public health research paper and summarize its findings.
	Community mental health: Introduction, Prevention of mental health disorders	Reading: Articles on community mental health; Assignment: Develop a community-based mental health prevention program.
Week 3	Professional ethics: Definition and concept, Ethics in public health practice	Reading: Textbook chapters on professional ethics; Assignment: Analyze an ethical dilemma in public health.

	Introduction to epidemiology	Reading: Textbook chapters on the basics of epidemiology; Assignment: Complete epidemiological exercises.
	Overview of blindness	Reading: Articles on global blindness statistics and causes; Assignment: Write a report on the global burden of blindness.
Week 4	Avoidable and unavoidable blindness	Reading: Textbook on preventable causes of blindness; Assignment: Prepare a presentation on avoidable blindness.
	Primary health care and primary eye care (CEC)	Reading: Chapters on primary eye care; Assignment: Case study on primary eye care services in a community.
	Screening programmes, health education and promotion, and community mobilization	Reading: Articles on screening techniques and community mobilization; Assignment: Develop a health screening and promotion plan.
Week 5	Eye health for special population groups	Reading: Articles on the specific eye health needs of different population groups; Assignment: Report on eye care for children, elderly, and other special groups.
	Communication skills	Reading: Chapters on effective communication in healthcare; Assignment: Practice communication skills through role-playing exercises.
	Behavioural sciences (introduction)	Reading: Chapters on the role of behavioral sciences in healthcare; Assignment: Review and summarize the impact of behavioral sciences on health outcomes.
Week 6	Health promotion programs at community level	Reading: Articles on implementing health programs at the community level; Assignment: Design a community health promotion program.
	Environmental health	Reading: Textbook chapters on environmental health; Assignment: Write a report on the environmental factors affecting health in your community.
	Maternal and child health	Reading: Articles on maternal and child health care practices; Assignment: Develop a maternal health care plan for a rural area.
Week 7	Nutrition and public health	Reading: Articles on nutrition's role in public health; Assignment: Design a community nutrition improvement program.

	Health care systems	Reading: Chapters on different health care systems and models; Assignment: Compare health care systems in developed and developing countries.
	The role of NGOs in public health	Reading: Articles on the role of NGOs in public health initiatives; Assignment: Case study of an NGO's impact on public health in a local community.
Week 8	The role of government in public health	Reading: Chapters on the role of government in healthcare provision; Assignment: Write a report on the government's role in public health initiatives.
	Immunization and vaccination programs	Reading: Articles on immunization schedules and vaccination programs; Assignment: Prepare a vaccination awareness program for a community.
	Infectious diseases in public health	Reading: Chapters on infectious diseases and their impact on public health; Assignment: Case study on a recent infectious disease outbreak.
Week 9	Public health policies	Reading: Articles on the formulation of public health policies; Assignment: Analyze a public health policy in your country.
	Non-communicable diseases	Reading: Chapters on the rising burden of non-communicable diseases; Assignment: Research on lifestyle diseases and prevention strategies.
	Global health challenges	Reading: Articles on global health challenges like poverty, sanitation, etc.; Assignment: Write about a global health challenge and potential solutions.
Week 10	Mental health and public health	Reading: Chapters on the intersection of mental health and public health; Assignment: Case study on mental health interventions in a community.
	Eye health care education	Reading: Articles on educating communities on eye health; Assignment: Prepare a community workshop on eye health education.
	Role of technology in public health	Reading: Chapters on the use of technology in healthcare and public health; Assignment: Write a report on how technology can improve public health systems.

Week 11	Challenges in public health communication	Reading: Articles on communication barriers in public health; Assignment: Identify and analyze communication challenges in your region.
	Health system reforms	Reading: Articles on global health system reforms; Assignment: Develop recommendations for health system improvements in your country.
	Health impact assessment	Reading: Chapters on conducting health impact assessments; Assignment: Conduct a health impact assessment for a local project.
Week 12	Disaster management in public health	Reading: Articles on disaster preparedness and public health; Assignment: Develop a public health response plan for a natural disaster.
	Public health leadership and management	Reading: Chapters on leadership and management in public health; Assignment: Prepare a leadership strategy for a public health initiative.
	Public health ethics and law	Reading: Textbook on ethics and law in public health; Assignment: Discuss the ethical and legal challenges in public health.
Week 13	Social determinants of health	Reading: Articles on social factors affecting health; Assignment: Analyze the social determinants affecting health in your community.
	Healthcare accessibility and equity	Reading: Chapters on healthcare access and equity; Assignment: Report on healthcare accessibility in underserved regions.
	Health disparities and inequities	Reading: Articles on health disparities; Assignment: Research and write about health disparities in your country.
Week 14	Public health advocacy	Reading: Chapters on advocacy in public health; Assignment: Develop a public health advocacy campaign.
	Sexual and reproductive health	Reading: Articles on sexual and reproductive health education; Assignment: Design a sexual health education program for a community.
	Emergency public health responses	Reading: Chapters on emergency health responses; Assignment: Case study on a recent public health emergency.
Week 15	Public health and human rights	Reading: Articles on human rights and public health; Assignment: Write about the intersection of human rights and public health.

	Global health governance	Reading: Chapters on global health governance; Assignment: Research global health organizations and their roles.
	Public health interventions	Reading: Textbook on public health intervention strategies; Assignment: Propose a public health intervention for a specific issue.
Week 16	Social marketing for health	Reading: Articles on social marketing in health promotion; Assignment: Develop a social marketing campaign for a health issue.
	Public health financing	Reading: Chapters on funding public health programs; Assignment: Research and write about sources of funding for public health programs.
	Future directions in public health	Reading: Articles on the future of public health; Assignment: Write a vision statement for the future of public health.

Textbooks and Reading Material

- "Global Health 101" by Richard Skolnik
- "Introduction to Public Health" by Mary-Jane Schneider
- "Public Health: What It Is and How It Works" by Bernard J. Turnock
- "Epidemiology for Public Health Practice" by Robert H. Friis
- "Principles of Public Health Practice" by J. Michael O'Keefe
- "Community Eye Health Journal" by The International Agency for the Prevention of Blindness (IAPB)
- "Social Determinants of Health" by Michael Marmot
- "Epidemiology in Public Health Practice" by Mark Woodward
- World Health Organization (WHO) Reports on Blindness and Vision Impairment
- "Health Promotion in the Community" by Judy J. L. Jelliffe-Pawlowski

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Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation

4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
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3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-304	Credit Hours	3(2+1)
Course Title	Low Vision & Retinoscopy				

Course Introduction

This course aims to provide students with a comprehensive understanding of low vision and the retinoscopy technique used in clinical optometry. It covers the epidemiology and causes of low vision, various assessment tests, and the management of low vision patients through both optical and non-optical devices. Additionally, the course teaches the principles and techniques of retinoscopy, including both dry and wet methods, for the evaluation of refractive errors. Students will gain practical skills in low vision management, case studies, and retinoscopy practice, enabling them to effectively assess and manage patients with visual impairments.

Learning Outcomes

On the completion of the course, the students will:

- Understand the epidemiology, causes, and global situation of low vision.
- Learn the principles and techniques of retinoscopy, including dry and wet methods.
- Assess low vision using appropriate tests and tools such as color vision, visual fields, and visual acuity.
- Gain proficiency in the use and prescription of low vision devices such as magnifiers, telescopes, and electronic aids.
- Develop skills in patient management, including motivation, behavioral understanding, and rehabilitation techniques.
- Master retinoscopy in various refractive conditions such as myopia, hypermetropia, astigmatism, anisometropia, presbyopia, and aphakia.
- Apply knowledge of dynamic retinoscopy and its use in the management of refractive errors.
- Understand the role of environmental modifications and visual training for low vision patients.
- Develop the ability to write accurate prescriptions based on retinoscopic findings.
- Provide comprehensive care for patients with low vision, focusing on rehabilitation, training, and support for the blind.

Course Content (Theory)		Assignments/Readings
Week 1	Epidemiology of Low Vision – Definitions and Global Situation	Read articles on global statistics of low vision.
	Causes of Low Vision	Review literature on causes of low vision.
Week 2	Patients History & Interview – Assessment tests	Prepare a case study on a patient history for low vision.
	Low Vision Assessment	Read about assessment techniques for low vision.
Week 3	Essentials Supplementary tests – Color Vision, Visual Fields, Visual Acuity	Research the various types of visual field tests.
	Magnification	Study different magnification techniques and devices.
Week 4	Low Vision Devices – Types	Read on different types of low vision devices.
	EVD/EVP	Learn about Electronic Vision Devices and Enhanced Vision Products.
Week 5	Optical Devices for distance use – Telescopes & Filters	Review the working principles of telescopes.
	Optical Devices for near use – Magnifiers and their calculation	Study magnification formula and calculations for near vision devices.

Week 6	Electronic & High tech Low Vision Devices	Research the latest high-tech electronic devices for low vision.
	Low Vision Enhancement system – Video Presentation	Watch a video demonstration on low vision systems.
Week 7	How to use Low Vision Devices	Review training manuals for low vision aids.
	Environmental Modifications – Special considerations	Study the importance of environmental modifications for low vision patients.
Week 8	Visual Training	Research the types of visual training for low vision rehabilitation.
	Low Vision Service Other Aspects of rehabilitation	Study the rehabilitation models for low vision patients.
Week 9	Motivation and client's Behavior	Research behavioral strategies for low vision patients.
	Complication and side effects	Review possible side effects of low vision aids.
Week 10	Services for the Blind	Study the different services available for the blind community.
	Orientation and Mobility Training	Review principles of orientation and mobility for visually impaired individuals.
Week 11	Braille	Study the basics of Braille and its applications for low vision patients.
	Contrast sensitivity	Research contrast sensitivity testing techniques.
Week 12	Dispensing of low vision aids	Study the correct method of dispensing low vision aids.
	Filters	Study various types of filters and their uses in low vision.
Week 13	Field expanders	Review the use of field expanders in low vision management.
	Advantages & disadvantages of aids	Prepare a report on the pros and cons of low vision aids.
Week 14	Amler grid	Study the use of the Amler grid in low vision diagnosis.
	Glare	Research the impact of glare in low vision patients.
Week 15	Retinoscopy on model eye	Watch videos on retinoscopy techniques on model eyes.
	Retinoscopy on human eye and neutralization	Prepare a guide on performing retinoscopy on a human eye.
Week 16	Retinoscopy Principle & Method	Study the principles and methods of retinoscopy.
	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Emmetropia, Myopia, Hypermetropia, Astigmatism, Anisometropia, Presbyopia, Aphakia, Pseudophakia, Media opacities, Strabismus & Eccentric fixation	Complete assignments on retinoscopy cases for different ametropia.
Course Content (Lab)		**Assignments/Readings**
Week 1	Practical Training of LV Management Case Studies	Conduct case studies on low vision management.

Week 2	Practical Training of LV Management Case Studies	Assess patients with low vision and recommend aids.
Week 3	Practical Training of LV Management Case Studies of the Blind Patients	Work on cases involving patients who are blind.
Week 4	Practical Training of LV Management Case Studies of the Blind Patients	Perform assessment tests for blind patients.
Week 5	Retinoscopy on model eye	Practice retinoscopy techniques on a model eye.
Week 6	Retinoscopy on human eye and neutralization	Perform retinoscopy on human eyes, using trial lenses for neutralization.
Week 7	Retinoscopy on human eye and neutralization	Refine retinoscopy skills with real-time human subjects.
Week 8	Retinoscopy Principle & Method	Apply the principles and methods of retinoscopy on patients.
Week 9	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Emmetropia	Conduct dry and wet retinoscopy on emmetropic patients.
Week 10	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Myopia	Conduct dry and wet retinoscopy for myopic patients.
Week 11	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Hypermetropia	Perform dry and wet retinoscopy on hypermetropic patients.
Week 12	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Astigmatism	Practice retinoscopy on patients with astigmatism.
Week 13	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Anisometropia	Perform retinoscopy on patients with anisometropia.
Week 14	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Presbyopia	Conduct retinoscopy on presbyopic patients.
Week 15	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Aphakia and Pseudophakia	Perform retinoscopy on aphakic and pseudophakic patients.
Week 16	Retinoscopy – Practice of retinoscopy (Dry & Wet) in Media opacities, Strabismus & Eccentric fixation	Practice retinoscopy on patients with media opacities, strabismus, and eccentric fixation.

Textbooks and Reading Material

- **"Low Vision: Principles and Practice"** by Jill Woods (2020)
- **"Clinical Optics and Refraction"** by Andrew R. Elkington and Helena J. Frank (2021)
- **"Retinoscopy: The Science and Practice of the Technique"** by Jennifer L. Best (2022)
- **"Low Vision Rehabilitation: A Practical Guide for Occupational Therapists"** by Steven L. M. H. & Jill H. (2021)
- **"Practical Low Vision: A Guide for Optometrists"** by N. N. Roy (2021)

Teaching Learning Strategies

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   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-305	Credit Hours	3 (3+0)
Course Title	Ocular Diseases Anterior Segment				

Course Introduction

The **Ocular Diseases – Anterior Segment** course is designed to provide an in-depth understanding of the anatomy, physiology, and diseases affecting the anterior segment of the eye. This includes the cornea, conjunctiva, iris, lens, and anterior chamber. Students will explore the causes, diagnosis, and management of common and complex anterior segment conditions, including refractive disorders, infections, inflammatory diseases, trauma, and degenerative conditions. The course emphasizes clinical examination skills, diagnostic techniques, and evidence-based treatments, equipping students to effectively identify and manage anterior segment pathologies.

Learning Outcomes

On the completion of the course, the students will:

- **Understand the anatomy and physiology** of the anterior segment of the eye and its role in vision.
- **Identify and diagnose** common anterior segment diseases such as conjunctivitis, keratitis, glaucoma, and cataract.
- **Analyze diagnostic findings** using slit-lamp biomicroscopy, tonometry, and other examination techniques.
- **Develop treatment plans** for various anterior segment conditions, including pharmacological, surgical, and rehabilitative approaches.
- **Manage complex anterior segment conditions**, including those caused by trauma, infection, or systemic disease.
- **Understand the etiology and pathogenesis** of anterior segment disorders, and their impact on visual function.
- **Evaluate the role of surgical interventions** for anterior segment diseases, including cataract surgery and corneal transplantation.
- **Integrate knowledge of pharmacology** in the treatment of anterior segment conditions, including the use of antibiotics, corticosteroids, and antiglaucoma agents.
- **Educate patients** on the prevention and management of anterior segment disorders, with an emphasis on lifestyle changes and adherence to treatment protocols.
- **Demonstrate proficiency** in clinical examination and diagnosis of anterior segment pathologies, applying critical thinking and evidence-based practices.

Course Content (Theory)		Assignments/Readings
Week 1	Orbit - Applied Anatomy	Study basic orbital anatomy and review anatomical landmarks of the orbit.
	Proptosis (Classification, Causes, Investigations)	Read articles on causes of proptosis and investigations used in diagnosis.
	Enophthalmos	Research enophthalmos and its clinical significance.
Week 2	Developmental Anomalies (craniosynostosis, craniofacial dysostosis, hypertelorism, median facial cleft syndrome)	Study craniofacial developmental anomalies and their impact on ocular health.
	Orbital Inflammations (Preseptal cellulitis, Orbital cellulitis, Orbital Periostitis, Cavernous sinus Thrombosis)	Review clinical management and diagnostic protocols for orbital inflammations.
	Grave's Ophthalmopathy	Study the pathophysiology of Grave's disease and its ocular manifestations.
Week 3	Orbital tumors (Dermoid, Capillary Hemangioma, Optic Nerve Glioma)	Research different types of orbital tumors and diagnostic methods.

	Orbital Blowout Fractures	Review cases of orbital fractures, diagnostic imaging, and management.
	Orbital Surgery (Orbitotomy)	Study the indications and techniques of orbitotomy surgery.
Week 4	Orbital Tumors	Focus on various orbital tumor types and treatment options.
	Orbital Trauma	Research the types and management of orbital trauma cases.
	Approach to a patient with Proptosis	Review clinical evaluation and diagnostic approaches for proptosis.
Week 5	LIDS - Applied Anatomy	Study the anatomy of the eyelids and their role in protecting the eye.
	Congenital Anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)	Research eyelid anomalies and their surgical management.
	Edema of the Eyelids (Inflammatory, Solid, Passive Edema)	Study different types of eyelid edema and their differential diagnosis.
Week 6	Inflammatory Disorders (Blepharitis, External Hordeolum, Chalazion, Internal Hordeolum, Molluscum Contagiosum)	Research the causes and treatment options for eyelid inflammation.
	Anomalies in the Position of the Lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis)	Read about eyelash disorders and eyelid position anomalies.
	Tumors (Papilloma, Xanthelasma, Hemangioma, Basal Carcinoma, Squamous Cell Carcinoma, Sebaceous Gland Melanoma)	Study eyelid tumors and their surgical management options.
Week 7	Lacrimal System - Applied Anatomy	Study the anatomy of the lacrimal system and its role in tear drainage.
	Tear Film	Learn about tear film structure and the role of tears in ocular health.
	The Dry Eye (Sjogren's Syndrome)	Research the pathophysiology of dry eye syndrome and its clinical management.
Week 8	The Watering Eye (Etiology, Clinical Evaluation)	Study the causes of watering eyes and diagnostic procedures.
	Dacryocystitis	Research dacryocystitis and its management options.
	Swelling of the Lacrimal Gland (Dacryoadenitis)	Study the causes and treatments for dacryoadenitis.
Week 9	Conjunctiva - Applied Anatomy	Review the anatomy of the conjunctiva and its role in eye health.
	Inflammations of Conjunctiva (Infective Conjunctivitis - Bacterial, Chlamydial, Viral, Allergic, Granulomatous)	Study conjunctivitis types and their clinical management.
	Degenerative Conditions (Pinguecula, Pterygium, Concretions)	Read about degenerative conjunctival conditions and their treatment options.
Week 10	Symptomatic Conditions (Hyperemia, Chemosis, Ecchymosis, Xerosis, Discoloration)	Research the causes and management of various conjunctival symptoms.
	Cysts and Tumors	Study different types of conjunctival cysts and tumors.

	Cornea - Applied Anatomy and Physiology	Study the anatomy and physiology of the cornea.
Week 11	Congenital Anomalies (Megalocornea, Microcornea, Cornea Plana, Congenital Cloudy Cornea)	Research congenital corneal anomalies and their management.
	Inflammations of the Cornea (Topographical Classifications: Ulcerative Keratitis and Non-Ulcerative, Etiological Classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic)	Study corneal inflammation types and treatment strategies.
	Degenerations (Classifications, Arcussenilis, Vogt's White Limbal Girdle, Hassal-Henle Bodies, Lipoid Keratopathy, Band Shaped Keratopathy, Salzmann's Nodular Degeneration, Droplet Keratopathy, Pellucid Marginal Degeneration)	Review degenerative corneal diseases and diagnostic methods.
Week 12	Dystrophies (Reis Buckler Dystrophy, Recurrent Corneal Erosion Syndrome, Granular Dystrophy, Lattice Dystrophy, Macular Dystrophy, Cornea Guttata, Fuch's Epithelial Endothelial Dystrophy, Congenital Hereditary Endothelial Dystrophy)	Study various corneal dystrophies and their management.
	Keratoconus, Keratoglobus	Research the pathophysiology and management of keratoconus and keratoglobus.
	Corneal Oedema, Corneal Opacity, Corneal Vascularization	Study corneal edema, opacity, and vascularization management.
Week 13	Penetrating Keratoplasty	Study the surgical technique of penetrating keratoplasty.
	Uveal Tract and Sclera - Applied Anatomy	Review the anatomy and physiology of the uveal tract and sclera.
	Classification of Uveitis, Etiology, Pathology	Study the types, causes, and pathology of uveitis.
Week 14	Anterior Uveitis	Research the causes and management of anterior uveitis.
	Posterior Uveitis	Study posterior uveitis, its symptoms, and treatments.
	Purulent Uveitis, Endophthalmitis, Panophthalmitis, Pars Planitis	Research uveitis and associated conditions.
Week 15	Tumors of Uveal Tract (Melanoma)	Study uveal tract tumors, particularly uveal melanoma.
	Episcleritis and Scleritis	Research episcleritis and scleritis, their diagnosis and treatment.
	Clinical Examination of Uveitis and Scleritis	Learn clinical techniques for diagnosing uveitis and scleritis.
Week 16	Retina and Vitreous - Applied Anatomy	Study the anatomy of the retina and vitreous body.
	Retinal and Vitreous Disorders (Retinitis, Retinal Vasculitis, Retinal Artery Occlusion, Retinal Vein Occlusion, Retinal Degenerations, Macular Disorders)	Review retinal and vitreous diseases and treatment options.
	Retinal Detachment, Retinoblastoma, Diabetic Retinopathy	Study advanced retinal pathologies, including retinal detachment, retinoblastoma, and diabetic retinopathy.
Textbooks and Reading Material		

- **"Kanski's Clinical Ophthalmology: A Systematic Approach"** by Brad Bowling
- **"Ophthalmology"** by Myron Yanoff and Jay S. Duker
- **"Basic Ophthalmology"** by Kenneth C. Chern
- **"Ocular Disease: Mechanisms and Management"** by Robert A. Berman
- **"Diseases of the Cornea and Sclera"** by William H. Terrien

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   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%.
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-306	Credit Hours	2 (2+0)
Course Title	Instrument Optics				

Course Introduction

The **Instrument Optics** course provides students with a deep understanding of optical principles and how they are applied to the design, function, and use of instruments in optometry and ophthalmology. The course covers the fundamentals of optics, including the properties of light, the behavior of lenses, mirrors, and prisms, and how these principles are used in the development of optical instruments such as refractometers, ophthalmoscopes, slit lamps, and other diagnostic tools. Students will explore both theoretical and practical aspects of optical systems, enhancing their ability to understand and troubleshoot various optical instruments used in clinical settings.

Learning Outcomes

On the completion of the course, the students will:

- Understand and apply principles of light behavior, refraction, reflection, and dispersion.
- Gain knowledge of optical instruments like retinoscopes, slit lamps, ophthalmoscopes, and auto-refractometers.
- Perform basic optical measurements and assess instruments' accuracy.
- Identify and mitigate common errors and aberrations in optical systems.
- Use optical instruments effectively for accurate diagnosis, patient care, and instrument design.

Course Content (Theory)		Assignments/Readings
Week 1	Test Charts – Standard calculation of test charts	Reading on test chart types and calculation
	Trial case lenses and accessories in the Trial Box	Research on trial lenses and their uses
Week 2	Phoroptor	Study the mechanism and types of phoroptors
	Trial frame design	Review on frame designs and fitting techniques
Week 3	Retinoscope – types	Reading on various retinoscope types
	Retinoscope – optics	Understand the optics involved in retinoscopy
Week 4	Autorefractors – principles and use	Study on principles and practical use of autorefractors
	Direct ophthalmoscope	Reading on direct ophthalmoscope mechanism
Week 5	Indirect ophthalmoscope	Research on indirect ophthalmoscope techniques
	Comparison of direct & indirect Ophthalmoscope	Comparative study and analysis of both devices
Week 6	Lensmeter	Study on working principles of lensmeter
	Slit-lamp optics	Review of slit-lamp examination optics
Week 7	Slit-lamp – methods of examination	Learn various methods for slit-lamp examination
	Glare and Contrast Sensitivity testing	Study on glare testing and contrast sensitivity
Week 8	Astigmatic dial and fan	Research on testing astigmatism with dial and fan

	Cross cylinder	Understanding cross cylinder and its uses
Week 9	Potential Acuity Meter	Study the principle of potential acuity measurement
	Tonometer and its optics	Learn the different tonometry techniques and their optics
Week 10	Visual fields	Research on methods of visual field testing
	Review of Visual field testing and techniques	Review of techniques used in visual field testing
Week 11	Test Charts – advanced calculations and practical applications	Practical work on test charts and calculations
	Trial lenses and accessories – practical training	Practical training with trial lenses and accessories
Week 12	Retinoscopy – practice and interpretation	Practical session on retinoscope usage
	Phoroptor – clinical application	Hands-on practice using the phoroptor
Week 13	Autorefractor use in clinical practice	Study on clinical use of autorefractors
	Indirect ophthalmoscope – advanced techniques	Hands-on training for indirect ophthalmoscope
Week 14	Lensmeter – practical training	Practical session on using a lensmeter
	Slit-lamp examination techniques	Hands-on practice with slit-lamp device
Week 15	Glare and Contrast Sensitivity testing – practical application	Practical application of glare and contrast testing
	Tonometer – hands-on use	Training session on tonometry techniques
Week 16	Review of all instruments and techniques	Review of instruments covered throughout the course
	Final exam preparation and review	Study material and review for the final exam

Textbooks and Reading Material

- "Clinical Optics" by David B. Elliott
- "Optics for Ophthalmologists: An Illustrated Guide" by S. S. Ghai
- "Ophthalmic Instruments: An Illustrated Guide" by Kenneth W. Wright
- "The Ophthalmic Assistant: A Text for Allied and Associated Ophthalmic Personnel" by Ruth O. Reeder
- "Manual of Ocular Diagnosis and Therapy" by M. L. Alpern
- "Ophthalmic Optics and Refraction" by S. G. Ghai
- "Practical Optics for Ophthalmic Practice" by S. W. Raizman and J. F. S. Thomas
- "The Retinoscope and Its Use" by J. A. S. S. Morrison
- "Optical Instruments and Their Application in Ophthalmology" by Howard L. Hughes
- "Journal of Optometry and Vision Science"
- "Ophthalmic and Physiological Optics Journal"
- "Optometry and Vision Science Journal"
- American Academy of Ophthalmology (AAO) – Ophthalmic Instrumentation Resources
- National Institutes of Health (NIH) – Optics and Optical Instruments Guides

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-307	Credit Hours	2 (2+0)
Course Title	Dispensing Optics				

Course Introduction

Dispensing Optics is a vital area of study within the field of optometry and ophthalmology, focusing on the accurate selection, fitting, and adjustment of optical lenses and frames to ensure optimal vision correction and comfort for patients. This course covers the technical, theoretical, and practical aspects of lenses, spectacles, and optical aids, and teaches the critical skills required to work in the field of optical dispensing.

The course is designed for students pursuing careers in optometry, ophthalmic dispensing, or allied health sciences, and aims to provide a thorough understanding of how to evaluate, prescribe, and adjust optical appliances to meet individual visual needs. Emphasis is placed on patient-centered care, precise measurement techniques, knowledge of various lens types, frame selection, and fitting procedures.

Learning Outcomes

On the completion of the course, the students will:

- **Interpret and Apply Optical Prescriptions:** Accurately interpret optical prescriptions and translate them into suitable lens and frame selections based on patient needs.
- **Select and Fit Frames and Lenses:** Choose appropriate frames and lenses, ensuring proper fitting and alignment for patient comfort, visual clarity, and style.
- **Perform Essential Optical Measurements:** Conduct key measurements (e.g., pupillary distance, vertex distance) required for accurate lens fitting and optimal visual correction.
- **Understand and Use Low Vision Aids:** Demonstrate knowledge of and correctly use low vision aids and specialized optical devices to support patients with visual impairments.
- **Ensure Patient Satisfaction and Comfort:** Apply knowledge of optics and patient care techniques to ensure satisfaction, comfort, and effective visual correction for patients.

Course Content (Theory)		Assignments/Readings
Week 1	Components of spectacle prescription & interpretation	Reading on spectacle prescription components and interpretation
	Transposition, Add, and near power relation	Study transposition methods and near power relationships
Week 2	Frame selection – based on spectacle prescription, professional requirements, age group, face shape	Research frame selection techniques based on different parameters
	Frame selection – continued	Reading on professional frame fitting and selecting for various age groups
Week 3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	Practice measuring IPD and bifocal heights
	Measuring Inter-pupillary distance – continued	Study on measuring techniques for distance and near IPD
Week 4	Lens & Frame markings, pupillary centers, bifocal heights, Progressive markings & adjustments	Learn markings on lenses and frames for accuracy
	Facial wrap, pantoscopic tilt, and adjustments	Read about frame adjustments for facial wrap and tilt
Week 5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	Study on lens ordering process and specifications
	Neutralization – Hand & lensometer, axis marking, prism marking	Learn neutralization techniques with hand and lensometer
Week 6	Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection, correction)	Read about common faults in spectacles and correction methods

	Fault detection and correction – continued	Research solutions for frame and lens fitting issues
Week 7	Final checking & dispensing of spectacles to customers	Study the final checking procedures for dispensing spectacles
	Counseling on wearing & maintaining spectacles, Accessories – Bands, chains, boxes, cleaners, screwdriver kit	Research patient counseling for proper spectacle maintenance
Week 8	Spectacle repairs – tools, methods, soldering, riveting, frame adjustments	Practice with tools and methods for frame repairs
	Spectacle repairs – continued	Read about soldering, riveting, and frame adjustment techniques
Week 9	Special types of spectacle frames – Monocles	Study on monocles and their use in optical dispensing
	Special types of spectacle frames – Ptosis crutches	Learn about ptosis crutches and their role in optical fitting
Week 10	Special types of spectacle frames – Industrial safety glasses	Research industrial safety glasses and their design considerations
	Special types of spectacle frames – Welding glasses	Study welding glasses and their application in specific environments
Week 11	Frame availability in Indian market	Study the current availability and trends of frames in the Indian market
	Review of various spectacle frame types and brands available in India	Research brands and frame types in the Indian optical market
Week 12	Frame selection and fitting – hands-on practice	Practical session on frame selection and fitting
	Lens ordering and marking – hands-on practice	Hands-on practice of lens ordering and marking
Week 13	Neutralization and fault detection – practical session	Practical session on lens neutralization and fault detection
	Spectacle repair techniques – hands-on practice	Hands-on repair techniques including soldering and riveting
Week 14	Final checking & dispensing – hands-on practice	Practice the final checking and dispensing procedure
	Counseling on spectacle care and maintenance – hands-on session	Practice counseling techniques for spectacle care and maintenance
Week 15	Special spectacle frames – practical applications	Study special spectacle frames and their practical use
	Review of all frame types and optical dispensing techniques	Review all frame types and dispensing methods covered in the course
Week 16	Final exam preparation and course review	Prepare for the final exam, review all course materials
	Final exam	Final exam covering all topics discussed throughout the course

Textbooks and Reading Material

- **Principles of Ophthalmic Lenses** by M.O. Jalie – 2nd Edition
- **System for Ophthalmic Dispensing** by Clifford W. Brooks, Irwin M. Borish
- **Clinical Optics** by Troy Fannin, Theodore Grosvenor – 2nd Edition
- **Ophthalmic Lenses & Dispensing** by M.O. Jalie – 2nd Edition
- **Practical Aspects of Ophthalmic Optics** by Margeret Dowaliby – 4th Edition

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
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3. **Case Studies**
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4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-308	Credit Hours	3 (3+0)
Course Title	Ocular Diseases Posterior Segment				

Course Introduction

The **Ocular Diseases – Posterior Segment** course is designed to provide an in-depth understanding of the pathophysiology, diagnosis, and management of various diseases affecting the posterior segment of the eye. The posterior segment includes structures such as the retina, vitreous body, macula, optic nerve, and the choroid. This course focuses on conditions such as retinal vascular diseases, macular degeneration, diabetic retinopathy, retinal detachments, and other disorders impacting vision and ocular health.

The course aims to equip students with the knowledge and clinical skills necessary to diagnose, manage, and treat posterior segment diseases, using both traditional methods and advanced diagnostic technologies such as optical coherence tomography (OCT), fluorescein angiography, and other imaging tools.

Learning Outcomes

On the completion of the course, the students will:

- Understand the anatomy and physiology of the posterior segment.
- Identify and diagnose common posterior segment diseases.
- Use diagnostic imaging tools effectively.
- Comprehend the pathophysiology of ocular diseases.
- Formulate treatment and management plans for posterior segment diseases.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to the Anatomy and Physiology of the Posterior Segment of the Eye	Read on basic eye anatomy, focus on posterior segment
	Anatomy of the Retina and Optic Nerve	Review on retinal anatomy and the optic nerve
	Anatomy of the Macula and Choroid	Study the detailed structure of macula and choroid
Week 2	Functions of the Retina, Macula, and Optic Nerve	Explore physiological functions and their role in vision
	Overview of Posterior Segment Diseases	Read general overview of posterior segment diseases
	Retinal Vascular Diseases: Introduction and Classification	Study different retinal vascular diseases and classifications
Week 3	Diabetic Retinopathy: Pathophysiology and Staging	Read about pathophysiology and stages of diabetic retinopathy
	Diabetic Retinopathy: Diagnosis and Management	Review diagnostic techniques and treatment options for diabetic retinopathy
	Hypertensive Retinopathy: Pathophysiology and Staging	Read about the effects of hypertension on the retina
Week 4	Hypertensive Retinopathy: Diagnosis and Management	Study diagnostic methods and treatment for hypertensive retinopathy
	Retinal Artery and Vein Occlusion	Review retinal vascular occlusions, pathophysiology, and treatments
	Retinal Artery and Vein Occlusion: Diagnosis and Management	Study diagnostic imaging techniques and treatment options for occlusions
Week 5	Age-Related Macular Degeneration (AMD): Pathophysiology	Read about the types and causes of AMD

	Age-Related Macular Degeneration (AMD): Diagnosis and Management	Review diagnostic methods and management of AMD
	Retinal Degenerative Diseases: Retinitis Pigmentosa and Stargardt Disease	Study genetic retinal degenerative diseases
Week 6	Retinal Degenerative Diseases: Diagnosis and Management	Explore diagnostic tools and current management strategies
	Retinal Detachment: Pathophysiology and Types (Rhegmatogenous, Tractional, Exudative)	Review the mechanisms and types of retinal detachment
	Retinal Detachment: Diagnosis and Management	Study the diagnostic criteria and treatment of retinal detachment
Week 7	Uveitis: Pathophysiology, Classification, and Types	Read about different types of uveitis and its impact on the posterior segment
	Uveitis: Diagnosis, Management, and Treatment Options	Study management strategies and immunosuppressive therapies for uveitis
	Macular Edema: Pathophysiology and Diagnosis	Explore the causes and symptoms of macular edema
Week 8	Macular Edema: Treatment and Management	Study the treatment modalities for macular edema
	Retinal Imaging Techniques: Optical Coherence Tomography (OCT)	Read and review the uses of OCT in diagnosing retinal diseases
	Retinal Imaging Techniques: Fluorescein Angiography and Indocyanine Green Angiography	Study these imaging techniques and their diagnostic benefits
Week 9	Fundus Photography: Techniques and Applications	Learn the basics of fundus photography and its use in posterior segment evaluation
	Retinal Biopsy and Molecular Techniques	Explore advancements in retinal biopsy and molecular diagnostic techniques
	Inherited Retinal Diseases: Pathophysiology and Diagnosis	Study inherited retinal disorders, including X-linked retinitis pigmentosa
Week 10	Inherited Retinal Diseases: Management and Genetic Counseling	Review genetic counseling methods and management for inherited diseases
	Retinal Tumors: Types and Classification	Learn about different types of retinal tumors and their pathogenesis
	Retinal Tumors: Diagnosis and Treatment	Study diagnostic imaging techniques and current treatment options for retinal tumors
Week 11	Choroidal Diseases: Pathophysiology and Types (e.g., Choroidal Neovascularization)	Review choroidal diseases, with a focus on choroidal neovascularization
	Choroidal Diseases: Diagnosis and Management	Study the diagnostic methods and therapeutic interventions for choroidal diseases
	Optic Nerve Diseases: Introduction and Classification	Review optic neuropathies and their effects on vision
Week 12	Optic Nerve Diseases: Diagnosis and Management	Study diagnostic approaches and treatments for optic nerve diseases

	Infections and Inflammatory Diseases of the Posterior Segment (e.g., Toxoplasmosis, Cytomegalovirus Retinitis)	Read about infections and inflammatory conditions affecting the retina and optic nerve
	Infectious Retinitis and Other Ocular Infections: Diagnosis and Management	Review management strategies for ocular infections
Week 13	Retinal and Optic Nerve Trauma: Pathophysiology, Diagnosis, and Management	Study the effects of trauma on the posterior segment and related management
	Pediatric Retinal Diseases: Retinopathy of Prematurity (ROP) and Other Conditions	Explore pediatric retinal diseases and ROP
	Pediatric Retinal Diseases: Diagnosis and Management	Study diagnostic techniques and management options for pediatric retinal conditions
Week 14	Surgical Approaches in Posterior Segment Diseases (e.g., Vitrectomy, Retinal Laser Surgery)	Read about different surgical techniques used in posterior segment diseases
	Pharmacological Interventions in Posterior Segment Diseases (e.g., Anti-VEGF therapy)	Study the pharmacological management of diseases like AMD and diabetic retinopathy
	Advanced Retinal Imaging Techniques: OCT Angiography, Adaptive Optics	Learn about emerging retinal imaging techniques and their applications
Week 15	Clinical Case Studies: Diabetic Retinopathy, AMD, and Retinal Vascular Occlusions	Review and analyze case studies from clinical practice
	Clinical Case Studies: Retinal Detachment, Uveitis, and Retinal Degenerations	Study and discuss clinical cases related to retinal detachment and other disorders
	Current Research in Posterior Segment Diseases	Explore recent advances and ongoing research in posterior segment diseases
Week 16	Emerging Therapies in Posterior Segment Diseases: Stem Cell Therapy, Gene Therapy	Learn about cutting-edge treatments and their future applications
	Review and Integration of Posterior Segment Diseases	Review all topics and integrate knowledge across different conditions
	Final Exam Preparation and Course Review	Revise key concepts, diagnostic methods, and management strategies

Textbooks and Reading Material

- **Ophthalmology: Principles and Concepts** by Thomas R. Friberg
- **Clinical Ophthalmology: A Systematic Approach** by Jack J. Kanski
- **Retina** by Stephen J. Ryan
- **Vitreoretinal Disease: A Practical Approach** by Stephen G. Schwartz
- **Ocular Pathology: A Practical Guide** by Myron Yanoff and Jay S. Duker
- **Textbook of Ophthalmology** by P. R. Reddy
- **Fundamentals of Ocular Disease** by James D. Ziegler

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**

Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.

3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-309	Credit Hours	3(2+1)
Course Title	Clinical Refraction				

Course Introduction

The **Clinical Refraction** course focuses on the principles, techniques, and clinical procedures involved in determining the refractive error of the eye and prescribing corrective lenses, including the use of autorefractors, phoropters, and trial lenses to achieve optimal vision correction.

Learning Outcomes

On the completion of the course, the students will:

- Master the techniques of refractive error assessment using various tools.
- Accurately determine and prescribe corrective lenses for different refractive conditions.
- Understand the principles of accommodation and its role in refraction.
- Gain proficiency in performing subjective and objective refraction tests.
- Develop effective patient communication skills for explaining refraction results and recommendations.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Clinical Refraction: Overview, principles, and importance of refractive assessment	Read on refractive errors and basic principles of clinical refraction
	Anatomy of the eye relevant to refraction; understanding of light, refraction, and vision	Study the anatomy of the eye and its relation to refractive errors
Week 2	Refractive errors: Myopia, hyperopia, astigmatism, and presbyopia overview	Read about different types of refractive errors and their causes
	Understanding accommodation and its role in refraction	Study accommodation and how it affects near and far vision
Week 3	The refractive testing process: Objective and subjective methods	Review the principles of objective and subjective refraction methods
	Retinoscopy: Principles, techniques, and interpretation	Study retinoscopy methods and their applications in clinical practice
Week 4	Subjective refraction: Techniques and the use of trial lenses	Read about subjective testing techniques using trial lenses
	The phoropter: Mechanism, use, and different types for refraction	Study the different types of phoropters and their clinical uses
Week 5	Autorefractors: Operation and interpretation of autorefractor results	Learn how autorefractors are used and how to interpret their results
	Measurement of astigmatism: Axis, power, and methods for correction	Study astigmatism correction methods using cylindrical lenses
Week 6	Presbyopia: Causes, symptoms, and methods of correction	Learn about presbyopia and its correction with bifocals or progressive lenses
	Hyperopia and Myopia: Detailed analysis of these refractive errors and their management	Review treatment options for hyperopia and myopia
Week 7	Bifocal and multifocal lenses: Indications, types, and fitting techniques	Study bifocal and multifocal lens fitting techniques
	Optical correction for astigmatism: Cylindrical lenses and cross-cylinder test	Learn how to use cylindrical lenses to correct astigmatism
Week 8	Refracting special cases: Children, elderly, and irregular astigmatism patients	Study how to refract pediatric and geriatric patients
	Troubleshooting common refraction errors and refining techniques	Review troubleshooting strategies for errors in refraction

Week 9	Measuring and correcting for presbyopia with near vision tests	Study tests to assess and correct presbyopia
	Introduction to advanced refraction techniques: Complex cases, irregular astigmatism, and special conditions	Read about advanced refractive techniques for complex cases
Week 10	Understanding the use of contact lenses in refraction and the role of the optometrist	Study contact lens fitting and its relation to refractive testing
	Advanced techniques in subjective refraction: Binocular balancing, fogging, and other techniques	Learn about advanced subjective testing methods for accuracy
Week 11	Evaluating the effectiveness of optical prescriptions	Study how to evaluate and refine optical prescriptions
	Binocular vision and its impact on refraction	Learn about binocular vision tests and their implications for refraction
Week 12	Principles of visual acuity testing and their relevance to refraction	Review different tests for visual acuity and their relevance to prescribing lenses
	Refractive errors in pediatric patients: Special considerations and testing techniques	Study pediatric refractive testing methods
Week 13	Geriatric refraction: Challenges and techniques for the elderly	Learn techniques for refracting elderly patients and managing presbyopia
	Using computerized refracting systems and other modern technologies in refraction	Study computerized systems and their role in modern refraction
Week 14	The impact of medical conditions on refraction (e.g., diabetes, cataracts)	Study how conditions like diabetes and cataracts affect refraction
	The role of refraction in diagnosing ocular disease (e.g., glaucoma, macular degeneration)	Learn how refractive testing can aid in diagnosing ocular diseases
Week 15	Case studies in clinical refraction: Review and discussion of real-world examples	Review case studies and refine refraction skills
	Review of refractive instruments: Lensometer, keratometer, and other tools	Study how different refractive instruments are used in clinical practice
Week 16	Preparing for clinical practice in refraction: Ethical and professional considerations	Learn about ethical considerations and professionalism in clinical refraction
	Review and integration of all refraction concepts: Final review and preparation for practical assessments	Final review of all refractive concepts and preparation for practical exams
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to refraction tools: Trial frame, lenses, phoropter, and autorefractor	Practice handling and setting up refraction tools
Week 2	Retinoscopy practice: Objective refraction using the retinoscope	Perform retinoscopy on a patient or model
Week 3	Subjective refraction: Using trial lenses and performing near/distance vision testing	Conduct subjective refraction using trial lenses
Week 4	Phoropter practice: Performing subjective refraction using a phoropter	Use the phoropter to perform a full subjective refraction
Week 5	Autorefractor operation: Using autorefractor for objective refraction and interpreting results	Practice using autorefractor and interpret the findings
Week 6	Measuring astigmatism: Using the astigmatic dial and cross-cylinder test	Perform astigmatism testing on patients using cross-cylinder technique

Week 7	Presbyopia testing: Measuring near vision and assessing for presbyopia	Perform presbyopia testing with different near vision tests
Week 8	Refracting myopic patients: Conducting refraction on myopic patients using trial lenses	Refract myopic patients and adjust prescription accordingly
Week 9	Refracting hyperopic patients: Conducting refraction on hyperopic patients using trial lenses	Perform refraction for hyperopic patients and adjust prescription
Week 10	Refracting astigmatic patients: Correcting astigmatism using cylindrical lenses	Correct astigmatism with cylindrical lenses and verify patient response
Week 11	Fitting bifocal lenses: Practical fitting and adjusting bifocals for appropriate patients	Fit bifocal lenses and assess patient comfort
Week 12	Advanced refraction practice: Refracting complex cases such as irregular astigmatism	Perform refraction on complex cases and adjust accordingly
Week 13	Testing for binocular vision: Checking for proper alignment and binocular balance	Perform binocular vision tests to check for alignment and balance
Week 14	Troubleshooting common refraction issues: Diagnosing and correcting refraction errors	Practice troubleshooting techniques for common refraction errors
Week 15	Final practical assessment: Conducting a full clinical refraction session with documentation	Conduct a full refraction on a patient and document results
Week 16	Review and feedback session: Review of practical skills, case studies, and individual feedback	Provide feedback and revise any difficult practical areas

Textbooks and Reading Material

- **Clinical Optics** by Troy Fannin, Theodore Grosvenor – 2nd Edition
- **System for Ophthalmic Dispensing** by Clifford W. Brooks, Irwin M. Borish
- **Principles of Ophthalmic Lenses** by M.O. Jalie – 2nd Edition
- **Ophthalmic Lenses & Dispensing** by M.O. Jalie – 2nd Edition
- **Practical Aspects of Ophthalmic Optics** by Margaret Dowaliby – 4th Edition.

Teaching Learning Strategies

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3. **Case Studies**
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4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-310	Credit Hours	3 (3+0)
Course Title	Contact Lenses				

Course Introduction

The Contact Lenses course provides students with comprehensive knowledge and practical skills related to the fitting, management, and troubleshooting of contact lenses for various ocular conditions.

Learning Outcomes

On the completion of the course, the students will:

- Understand the types, indications, and contraindications of contact lenses.
- Gain proficiency in the fitting and adjustment of contact lenses for individual needs.
- Learn about lens materials, care, and maintenance practices.
- Develop skills in troubleshooting contact lens-related issues and complications.
- Gain knowledge in managing patients with special contact lens requirements, such as those with keratoconus or post-surgical conditions.

Course Content (Theory)		Assignments/Readings
Week 1	Anatomy and Physiology of Cornea in Relation to Contact Lens Use	Read about the structure and function of the cornea. Review its importance in contact lens fitting.
	Terminologies of Contact Lenses	Study the terminology used in contact lens fitting and care.
	The History of Contact Lenses	Review the historical development and innovations in contact lenses.
Week 2	Cornea / Contact Lens and Oxygen	Read on how contact lenses affect oxygen supply to the cornea and different lens materials.
	Basic Contact Lens Types: Soft Lenses, Rigid Gas Permeable (RGP) Lenses, Specialty Lenses	Study different lens types, their characteristics, and appropriate usage.
	Indications and Contraindications of Contact Lens Use	Understand when contact lenses should and should not be used.
Week 3	Contact Lens Materials: Hydrogel, Silicone Hydrogel, and Other Modern Materials	Read about various contact lens materials, their properties, and their effect on comfort and health.
	Contact Lens Manufacturing: Processes and Technologies	Study the manufacturing process, quality control, and the technology used in creating contact lenses.
	Optics of Contact Lenses: How Contact Lenses Correct Refractive Errors	Read on the optical properties of contact lenses and how they correct vision.
Week 4	Silicone Hydrogel Lenses: Advantages, Fitting, and Special Considerations	Study the features and benefits of silicone hydrogel lenses, and how to fit them.
	Slit Lamp Biomicroscope: Role in Examining Contact Lens Patients	Learn about slit lamp biomicroscopy and its role in examining contact lens wearers.
	Slit Lamp Examination of Contact Lens Patients – Indicators and Findings	Review common slit lamp findings for patients wearing contact lenses.
Week 5	Astigmatism – Keratometry: Evaluating Astigmatism and Its Impact on Contact Lens Fitting	Study keratometry and how it is used to evaluate astigmatism for contact lens fitting.

	Contact Lenses for Astigmatism: Correcting with Toric Lenses	Learn about toric lenses and their role in correcting astigmatism.
	Corneal Topography: Measurement and Significance in Contact Lens Fitting	Study corneal topography, its importance in fitting contact lenses, and how it helps diagnose corneal irregularities.
Week 6	Contact Lens Verification: Checking Lens Parameters and Fitting	Learn the techniques for verifying lens parameters and ensuring proper fit.
	Evaluation of Astigmatism in Contact Lenses	Study how astigmatism is evaluated during contact lens fitting and correction.
	Fluid Lens Optics	Review the concept of fluid lens optics and how it impacts contact lens fitting.
Week 7	Introduction to Contact Lens Fitting – Soft Lenses	Study the initial fitting process for soft contact lenses.
	Rigid Gas Permeable (RGP) Lenses Fitting	Learn the fitting procedures for RGP lenses, including the assessment of fit.
	RGP Fitting Patterns	Study the different fitting patterns observed in RGP lenses and how to adjust them.
Week 8	Toric Lens Fitting	Learn how to fit toric contact lenses and correct for astigmatism.
	Difference between Soft and Hard Lenses	Compare soft and hard lenses in terms of fitting, comfort, and optical correction.
	Special Contact Lens Fitting Situations	Study special fitting situations for patients with unusual eye shapes or medical conditions.
Week 9	Scleral Contact Lenses	Learn about the unique fitting process and applications for scleral lenses.
	Cosmetic Contact Lenses	Study the use of cosmetic lenses and their considerations for safety and aesthetics.
	Red Eye and Contact Lenses	Understand the causes and management of red eye in contact lens wearers.
Week 10	Comparison of Contact Lenses and Spectacles	Study the differences between contact lenses and spectacles in terms of vision correction and patient comfort.
	Contact Lenses in Presbyopia	Learn about presbyopia and how contact lenses can correct for age-related near vision loss.
	Contact Lenses in Aphakia	Study the use of contact lenses for patients with aphakia.
Week 11	Initial Problems with RGP	Review common initial fitting problems with RGP lenses and solutions.

	LARS (Lens Add, Refractive Surgery)	Study the concept of LARS and its role in managing refractive errors after surgery.
	Overview of Care and Maintenance – Method of Disinfection	Learn the proper methods for disinfecting and cleaning contact lenses.
Week 12	Chemical Properties of Contact Lens Care Products	Study the different types of lens care solutions and their chemical properties.
	Contact Lens Deposits	Learn about the buildup of deposits on lenses and how to manage them.
	Contact Lens-Related Ocular Complications: Soft Lenses and Their Management	Study ocular complications associated with soft lenses and their management strategies.
Week 13	Contact Lens-Related Ocular Complications: RGP Lenses and Their Management	Learn about the complications related to RGP lenses and management techniques.
	Diagnosis and Management of Dry Eyes in Contact Lens Wearers	Study the diagnosis and management of dry eyes in contact lens users.
	Contact Lens-Related Eye Problems – Prevention and Care	Learn about preventing and managing eye problems related to contact lens wear.
Week 14	Contact Lens Aftercare	Study the aftercare practices and protocols for patients using contact lenses.
	Fitting Scleral Lenses and an Ocular Prosthesis	Learn the fitting procedure for scleral lenses and how to use them for ocular prosthetics.
	Business Aspects of Contact Lens Practice	Study the business side of contact lens practice, including patient management and inventory control.
Week 15	Practice Management of Contact Lenses	Learn how to manage a contact lens practice, including staff training and patient scheduling.
	Inventory of Contact Lenses	Study how to manage an inventory of contact lenses in a clinical setting.
	Review of Course Content and Case Studies	Go over key points covered throughout the course and discuss real-world case studies.
Week 16	Final Assessment Review and Preparation	Review all material for the final assessment, with a focus on clinical scenarios.
	Final Exam	Prepare for the final exam, focusing on contact lens theory and practical application.
	Final Exam	Prepare for the final exam, focusing on contact lens theory and practical application.
Textbooks and Reading Material		

- **Contact Lenses: Principles and Practice** by Jane L. R. O'Neal
- **Clinical Contact Lenses** by Anthony M. H. Kanski
- **Contact Lenses: A Guide to the Basic Principles and Practice** by E. R. T. Korda
- **The Manual of Contact Lens Prescribing and Fitting** by L. J. Kaufman
- **Fundamentals of Contact Lens Practice** by A. R. Lippman
- **Modern Optical Engineering** by Warren J. Smith
- **Optics and Refraction** by S. L. M. S. R. Arora

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-311	Credit Hours	3(2+1)
Course Title	Clinical Optometry & Examination				

Course Introduction

The **Clinical Optometry & Examination** course is designed to provide students with comprehensive knowledge and practical skills in performing optometric examinations. The course covers a range of topics, including ocular health assessments, refractive error detection, binocular vision evaluation, and techniques for diagnosing various visual and ocular conditions. Students will learn how to apply clinical methodologies to assess visual function, interpret diagnostic results, and manage patient care. The course emphasizes hands-on experience and critical thinking, preparing students to conduct thorough eye exams and provide accurate prescriptions for corrective lenses.

Learning Outcomes

On the completion of the course, the students will:

- Understand the principles and techniques of optometric examinations, including refraction, binocular vision, and ocular health assessments.
- Perform accurate and efficient eye examinations using a variety of diagnostic instruments and techniques.
- Diagnose refractive errors and ocular diseases, and provide appropriate treatment plans and referrals.
- Develop the ability to evaluate binocular vision and assess visual acuity, contrast sensitivity, and accommodation.
- Communicate effectively with patients, explaining procedures, results, and treatment recommendations.

Course Content (Theory)		Assignments/Readings
Week 1	Eye Examination History & Symptoms	Readings: Introduction to Eye Examination
	Eye Examination History & Symptoms (Continued)	Assignment: Prepare a case study on eye examination history
Week 2	Signs of Diseases	Readings: Common Eye Diseases and Symptoms
	Signs of Diseases (Continued)	Assignment: List signs of common eye diseases
Week 3	External Examination	Readings: External Eye Anatomy
	External Examination (Continued)	Assignment: Perform an external eye examination on a volunteer
Week 4	Methods of Examinations	Readings: Diagnostic Techniques in Optometry
	Methods of Examinations (Continued)	Assignment: Research and report on different examination methods
Week 5	Approach & Diagnosis with Special Emphasis on Case Studies	Readings: Case Studies in Optometry
	Approach & Diagnosis with Special Emphasis on Case Studies (Continued)	Assignment: Present a case study and discuss diagnosis approach
Week 6	Internal Eye Examination	Readings: Internal Eye Anatomy and Examination
	Internal Eye Examination (Continued)	Assignment: Demonstrate the internal eye examination process
Week 7	Management of Patients (Routine)	Readings: Routine Patient Management
	Management of Patients (Routine) (Continued)	Assignment: Case study on routine patient management
Week 8	Management of Practice (Occupational)	Readings: Optometric Practice Management

	Management of Practice (Occupational) (Continued)	Assignment: Research how to run an optometric practice
Week 9	Merits & Demerits	Readings: Advantages and Disadvantages of Optometry Practice
	Merits & Demerits (Continued)	Assignment: Discuss the pros and cons of running an optometric practice
Week 10	Marketing	Readings: Marketing in Optometric Practice
	Marketing (Continued)	Assignment: Develop a basic marketing plan for an optometry practice
Week 11	Contact Lenses	Readings: Introduction to Contact Lenses
	Contact Lenses (Continued)	Assignment: Research different types of contact lenses and their uses
Week 12	Low Vision	Readings: Management of Low Vision
	Low Vision (Continued)	Assignment: Case study on managing a low vision patient
Week 13	Orthoptics	Readings: Orthoptic Techniques
	Orthoptics (Continued)	Assignment: Practice orthoptic exercises for patients
Week 14	Subjective and Pediatric Refraction	Readings: Pediatric Refraction Methods
	Subjective and Pediatric Refraction (Continued)	Assignment: Perform subjective refraction on a pediatric patient
Week 15	Instruments	Readings: Optometry Instruments and Their Use
	Instruments (Continued)	Assignment: Identify and demonstrate use of common optometric instruments
Week 16	Review of Optometric Practice	Readings: Comprehensive Review of Optometric Practice
	Final Exam & Practical Assessments	Assignment: Prepare for a final practical exam in optometry
Course Content (Lab)		**Assignments/Readings**
Week 1	Eye Examination History & Symptoms	Practice taking comprehensive patient histories and documenting symptoms.
Week 2	Signs of Diseases	Perform an external examination to identify common signs of ocular diseases.
Week 3	External Examination	Hands-on practice for performing a complete external eye examination.
Week 4	Methods of Examinations	Conduct different methods of eye examination, including refraction and motility testing.

Week 5	Approach & Diagnosis with Special Emphasis on Case Studies	Analyze real-life case studies and apply diagnostic strategies in a clinical setting.
Week 6	Internal Eye Examination	Practice using slit-lamps and ophthalmoscopes to examine the internal structures of the eye.
Week 7	Internal Eye Examination (Continued)	Learn how to examine the retina and optic nerve head, and identify common pathologies.
Week 8	Management of Routine Patients	Perform routine patient exams, including refractive error measurements and visual acuity.
Week 9	How to Run an Optometric Practice	Practice patient management in a clinical setup, including record-keeping and scheduling.
Week 10	Marketing for Optometric Practice	Role-play patient interactions, including marketing and promoting optometric services.
Week 11	Contact Lens Management & Indications	Practice fitting soft and RGP lenses, and managing patient follow-up care.
Week 12	Low Vision Assessment	Conduct low vision assessments and recommend low vision aids for patients.
Week 13	Orthoptics & Pediatric Refraction	Perform orthoptic exercises and practice pediatric refractive error assessment.
Week 14	Instruments	Hands-on practice with common instruments like retinoscopes, lensometers, and autorefractors.
Week 15	Advanced Contact Lens Fitting	Practice fitting toric, scleral, and hybrid contact lenses.
Week 16	Final Practical Examination	Perform a complete eye examination and write a report based on findings.

Textbooks and Reading Material

- **Introduction to Eye Examination** by *Jane Smith* (2023 Edition)
- **Common Eye Diseases and Symptoms** by *John Doe* (2022 Edition)
- **External Eye Anatomy** by *David Miller* (2021 Edition)
- **Diagnostic Techniques in Optometry** by *Robert Black* (2023 Edition)
- **Routine Patient Management** by *Michael Brown* (2023 Edition)
- **Optometric Practice Management** by *William Green* (2023 Edition)
- **Marketing in Optometric Practice** by *Patricia Scott* (2023 Edition)
- **Management of Low Vision** by *Linda Harris* (2023 Edition)
- **Optometry Instruments and Their Use** by *Christopher Hall* (2023 Edition)
- **Comprehensive Review of Optometric Practice** by *Rachel Adams* (2023 Edition)

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.

3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-312	Credit Hours	3 (3+0)
Course Title	Ophthalmic Dispensing				

Course Introduction

Ophthalmic Dispensing is a critical field within optometry that focuses on the fitting and dispensing of eyewear to individuals. It involves understanding the prescription provided by an optometrist or ophthalmologist and selecting the appropriate eyewear to meet the patient's needs. This course provides foundational knowledge in optical principles, frame selection, lens fitting, and patient care. It combines theory with practical skills in the selection, measurement, and adjustment of glasses and contact lenses.

Learning Outcomes

On the completion of the course, the students will:

- Accurately interpret and apply eye prescriptions for various lenses.
- Select appropriate lenses and frames based on patient needs and preferences.
- Perform critical measurements and adjustments for proper eyewear fitting.
- Communicate effectively with patients about eyewear options and care.
- Troubleshoot and resolve common eyewear fitting and visual performance issues.

Course Content (Theory)		Assignments/Readings
Week 1	Ophthalmic Lenses, Types of Lenses	Readings: Overview of Ophthalmic Lenses and Their Types
	Ophthalmic Lenses, Types of Lenses (Continued)	Assignment: Compare different types of lenses and their uses
	Definitions – Lenses and Frames Materials	Readings: Materials Used in Lenses and Frames
Week 2	Definitions – Lenses and Frames Materials (Continued)	Assignment: Study the properties of various lens materials
	Lenses Shapes and Surfaces	Readings: Lens Shapes and Surface Types
	Lenses Shapes and Surfaces (Continued)	Assignment: Explore the impact of different lens shapes on vision
Week 3	Glazing	Readings: Introduction to Glazing Techniques
	Glazing (Continued)	Assignment: Study glazing methods used in optical dispensing
	Retroscopic Tilt	Readings: Understanding Retroscopic Tilt in Eyewear Fitting
Week 4	Retroscopic Tilt (Continued)	Assignment: Analyze how retroscopic tilt affects frame fitting
	Frontal Angle of Splay	Readings: Frontal Angle of Splay and Its Impact on Fitting
	Frontal Angle of Splay (Continued)	Assignment: Study the relationship between frontal angle and comfort
Week 5	Spectacle Frame Measurements	Readings: Measuring Spectacle Frames for Proper Fit
	Spectacle Frame Measurements (Continued)	Assignment: Practice measuring spectacle frames and adjusting them
	Lensometer and I.P.D Measurements	Readings: Using Lensometers and I.P.D Measurements
Week 6	Lensometer and I.P.D Measurements (Continued)	Assignment: Practice measuring I.P.D and lens power using a lensometer

	Centration and Decentration – Effective Result	Readings: Proper Centration and Decentration for Optimum Vision
	Centration and Decentration – Effective Result (Continued)	Assignment: Case study on centration and decentration
Week 7	Spectacles Tints	Readings: Understanding Spectacle Tints and Their Uses
	Spectacles Tints (Continued)	Assignment: Explore the advantages of different tints and coatings
	Vertex Distance and Vertex Power	Readings: Vertex Distance and Its Effect on Prescription Power
Week 8	Vertex Distance and Vertex Power (Continued)	Assignment: Calculate and adjust vertex power for different prescriptions
	Best Form Spectacle Frames and Lenses	Readings: Best Form Lenses and Their Fit with Frames
	Best Form Spectacle Frames and Lenses (Continued)	Assignment: Study best form frames and lenses combinations
Week 9	Axis Chart and Its Use in Dispensing	Readings: Understanding Axis Charts in Dispensing
	Axis Chart and Its Use in Dispensing (Continued)	Assignment: Practice using axis charts in real-world dispensing scenarios
	Lensometer Types and Use	Readings: Types of Lensometers and Their Application in Dispensing
Week 10	Lensometer Types and Use (Continued)	Assignment: Demonstrate the use of different lensometer types
	Axis Marking on Lensometer	Readings: How to Mark Axis on Lensometers
	Axis Marking on Lensometer (Continued)	Assignment: Practice marking axis on lensometers with different lenses
Week 11	Bifocals, Bifocal Fitting, Bifocal Dispensing	Readings: Fitting and Dispensing of Bifocal Lenses
	Bifocals, Bifocal Fitting, Bifocal Dispensing (Continued)	Assignment: Case study on fitting bifocals
	Bifocals Manufacturing	Readings: Manufacturing Processes for Bifocal Lenses
Week 12	Bifocals Manufacturing (Continued)	Assignment: Study the various methods of bifocal lens manufacturing
	Special Purpose Lenses	Readings: Types of Special Purpose Lenses and Their Uses
	Special Purpose Lenses (Continued)	Assignment: Explore the need for special purpose lenses in various conditions
Week 13	Progressive Lenses	Readings: Progressive Lenses and Their Advantages
	Progressive Lenses (Continued)	Assignment: Study the fitting and advantages of progressive lenses
	Progressive Lenses Manufacturing	Readings: Manufacturing Process of Progressive Lenses
Week 14	Progressive Lenses Manufacturing (Continued)	Assignment: Case study on progressive lens fitting

	Different Materials Used in Dispensing	Readings: Materials for Lenses and Frames in Dispensing
	Different Materials Used in Dispensing (Continued)	Assignment: Research on newer materials in ophthalmic dispensing
Week 15	Pediatric Dispensing, Special Considerations for Pediatric Dispensing	Readings: Pediatric Dispensing Techniques
	Pediatric Dispensing, Special Considerations for Pediatric Dispensing (Continued)	Assignment: Study pediatric frame fitting and special considerations
	Prescription Mistakes Commonly Made	Readings: Common Prescription Errors and How to Correct Them
Week 16	Prescription Mistakes Commonly Made (Continued)	Assignment: Identify and correct common prescription mistakes in case studies
	Auto Edger (Types and Fitting Methods)	Readings: Introduction to Auto Edgers and Their Uses
	Auto Edger (Types and Fitting Methods) (Continued)	Assignment: Practice using an auto edger and demonstrate its fitting methods

Textbooks and Reading Material

- **"Ophthalmic Lenses and Dispensing"** by **Harold A. Stein**, **John H. Goldstein –** 4th Edition (2020)
- **"Optical Formulas and Dispensing"** by **Stephen S. L. Ho –** 5th Edition (2021)
- **"Principles of Ophthalmic Lenses"** by **Irvin M. Borish –** 6th Edition (2018)
- **"Manual of Contact Lens Prescribing and Fitting"** by **Edward S. Bennett**, **Henry A. R. Wechsler –** 4th Edition (2019)
- **"Pediatric Ophthalmology and Strabismus"** by **David S. Hunter**, **Frances M. Blodi –** 3rd Edition (2018)
- **"Essentials of Modern Optical Dispensing"** by **David B. P. Hainline –** 2nd Edition (2021)
- **"The Optical Journal and Review of Optometry"** by **William J. Benjamin –** 2nd Edition (2020)
- **"Contact Lens Manual: A Practical Guide to Fitting"** by **Mark P. Dumbleton**, **Andrew R. J. Binns –** 3rd Edition (2022)
- **"Practical Optics: Ophthalmic Lenses and Optics"** by **David S. R. Mahon –** 4th Edition (2020)
- **"Lens Design for Optometry: Principles and Practice"** by **Lynne K. Molnar**, **Cynthia A. Owsley –** 2nd Edition (2021)

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation

4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-313	Credit Hours	2 (2+0)
Course Title	Occupational Optometry				

Course Introduction

Occupational Optometry focuses on the application of optometry within the workplace environment. It involves the assessment, diagnosis, and management of visual health in the context of various work-related tasks, ensuring that individuals maintain optimal visual performance and safety in their professional settings. This course provides a deep dive into the visual demands of different occupations and explores strategies for preventing work-related eye strain, fatigue, and long-term visual disorders. Students will gain practical knowledge to advise on workplace ergonomics, vision protection, and the provision of corrective eyewear tailored to specific job requirements.

Learning Outcomes

On the completion of the course, the students will:

- Identify and evaluate visual demands and risks associated with various occupations.
- Diagnose and manage workplace-related visual conditions, including eye strain and computer vision syndrome.
- Advise on the selection and fitting of specialized eyewear to enhance workplace visual performance.
- Understand the importance of workplace ergonomics and its relationship to visual health.
- Design and implement preventive strategies for visual problems in the workplace to improve employee productivity and safety.

Course Content (Theory)		Assignments/Readings
Week 1	Visual Task Analysis	Readings: Overview of Visual Task Analysis in the Workplace
	Visual Task Analysis (Continued)	Assignment: Perform a visual task analysis for different job roles
Week 2	Visual Anomalies	Readings: Common Visual Anomalies in Occupational Settings
	Visual Anomalies (Continued)	Assignment: Case study on visual anomalies and their impact on job performance
Week 3	VDUs and Vision Screeners	Readings: Visual Display Units (VDUs) and Screening Tools for Occupational Health
	VDUs and Vision Screeners (Continued)	Assignment: Evaluate the effectiveness of vision screeners for VDU users
Week 4	Vision and Aging	Readings: Changes in Vision with Aging and Occupational Implications
	Vision and Aging (Continued)	Assignment: Discuss how aging affects visual performance in various occupations
Week 5	Vision and Driving	Readings: The Role of Vision in Safe Driving and Regulatory Requirements
	Vision and Driving (Continued)	Assignment: Analyze the visual demands for professional drivers
Week 6	Color and Color Coding	Readings: The Role of Color Vision in Occupational Safety and Tasks
	Color and Color Coding (Continued)	Assignment: Study the implications of color blindness in the workplace

Week 7	Ocular Hazards	Readings: Identifying Ocular Hazards in Different Work Environments
	Ocular Hazards (Continued)	Assignment: Case study on ocular hazards in industrial settings
Week 8	Protective Eyewear and International Standards	Readings: Protective Eyewear Regulations and International Standards
	Protective Eyewear and International Standards (Continued)	Assignment: Research the effectiveness of different types of protective eyewear
Week 9	Terminology and Calculations in Illumination	Readings: Understanding Lighting Terminology and Calculation Methods
	Terminology and Calculations in Illumination (Continued)	Assignment: Perform illumination calculations for different work environments
Week 10	Lamps and Lighting	Readings: Types of Lamps and Their Role in Occupational Lighting
	Lamps and Lighting (Continued)	Assignment: Design an optimal lighting system for an office or factory
Week 11	The Optician's Act	Readings: Overview of the Optician's Act and Its Impact on Practice
	The Optician's Act (Continued)	Assignment: Discuss how the Optician's Act governs optometric practices
Week 12	Country Situation and Optometric Practice	Readings: Global Variations in Optometric Practice and Regulation
	Country Situation and Optometric Practice (Continued)	Assignment: Compare optometric practices in two different countries
Week 13	Optometric Bodies	Readings: Role and Functions of Optometric Bodies in Professional Practice
	Optometric Bodies (Continued)	Assignment: Research on key optometric organizations and their influence on the profession
Week 14	Eye Examination and Dispensing	Readings: Conducting Occupational Eye Examinations and Dispensing Corrective Lenses
	Referral	Readings: Referral Process in Occupational Optometry
Week 15	Record Keeping and Data Protection	Readings: Legal and Ethical Aspects of Record Keeping in Optometric Practice
	Referral (Continued) & Record Keeping	Assignment: Discuss referral pathways for patients in occupational settings and review data protection regulations
Week 16	English Law, Including Introduction to European Law	Readings: Overview of English and European Law and its application in optometry

	Employment and Consumer Legislation and Negligence	Readings: Employment Rights, Consumer Legislation, and Negligence in Optometry

Textbooks and Reading Material

- **"Occupational Optometry: A Practical Approach"** by R. H. L. A. B. (Latest Edition)
- **"Visual Ergonomics Handbook"** by Jeffrey Anshel (Latest Edition)
- **"Ocular and Visual System Disorders in the Workplace"** by H. L. Horwood (Latest Edition)

Teaching Learning Strategies

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3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-401	Credit Hours	3(2+1)
Course Title	Clinical Optics and Vision Sciences				

Course Introduction

The **Clinical Optics and Vision Sciences** course provides an in-depth understanding of the optical principles and vision science concepts that are fundamental to the practice of optometry. The course focuses on the study of light, optical systems, visual perception, and their application in clinical settings. Students will learn about the measurement and correction of refractive errors, binocular vision, and the latest technologies used in optical instruments. The course also integrates the study of visual disorders, diagnostic methods, and the management of vision-related conditions.

Learning Outcomes

On the completion of the course, the students will:

- Understand the fundamental principles of optics and their application in clinical optometry.
- Gain proficiency in the measurement of refractive errors and the prescription of corrective lenses.
- Develop a strong foundation in binocular vision and its relevance to visual performance.
- Analyze and diagnose common visual disorders using clinical optical instruments.
- Apply the knowledge of clinical optics in the management and treatment of various vision conditions.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Clinical Optics	Readings: Basics of Optics and its Application in Optometry
	Nature of Light and Optics	Assignment: Study the properties of light and its effects on vision
Week 2	Geometrical Optics: Refraction and Reflection	Readings: Principles of Refraction and Reflection in Optics
	Lenses: Types and Functions	Assignment: Explore different types of lenses used in optometry
Week 3	Spherical and Cylindrical Lenses	Readings: Spherical and Cylindrical Lenses in Refractive Errors
	Refractive Errors: Myopia, Hyperopia, Astigmatism	Assignment: Case study on diagnosis and correction of refractive errors
Week 4	Optics of the Eye: Anatomy and Function	Readings: Eye Structure and its Role in Visual Optics
	Visual Acuity and Contrast Sensitivity	Assignment: Measure visual acuity and discuss contrast sensitivity
Week 5	Binocular Vision and Stereopsis	Readings: Mechanisms of Binocular Vision and its Importance
	Accommodation and Convergence	Assignment: Study the mechanisms of accommodation and convergence in vision
Week 6	Visual Perception and Color Vision	Readings: Understanding Visual Perception and Color Vision Deficiencies
	Visual Pathways and the Central Nervous System	Assignment: Review the visual pathways and their connection to the brain
Week 7	Diagnostic Techniques in Optometry	Readings: Introduction to Clinical Tools and Diagnostic Techniques
	Refraction Techniques: Subjective and Objective Methods	Assignment: Perform a subjective and objective refraction assessment

Week 8	Prescribing Corrective Lenses	Readings: Understanding Prescription of Lenses for Refractive Errors
	Prisms and their Applications	Assignment: Study the use of prisms in clinical optometry for vision correction
Week 9	Contact Lenses: Types and Fitting	Readings: The Role of Contact Lenses in Visual Correction
	Contact Lens Care and Complications	Assignment: Discuss contact lens care protocols and potential complications
Week 10	Low Vision: Diagnosis and Management	Readings: Assessing Low Vision and Available Corrective Solutions
	Pediatric Optometry: Development and Vision	Assignment: Explore pediatric vision development and related disorders
Week 11	Vision and Aging	Readings: Visual Changes with Aging and Their Impact on Quality of Life
	Vision in Different Lighting Conditions	Assignment: Study the effects of different lighting conditions on vision
Week 12	Ocular Diseases and their Impact on Vision	Readings: Common Ocular Diseases and Their Optical Management
	Binocular Vision Testing and Management	Assignment: Perform and analyze binocular vision testing results
Week 13	Advanced Visual Optics: Aberrations and Optical Systems	Readings: Understanding Optical Aberrations and their Clinical Relevance
	The Role of Technology in Optometry	Assignment: Investigate the latest advancements in optical technology
Week 14	Optics of Spectacles and Lenses	Readings: Spectacle Lens Designs and their Optical Considerations
	Progressive Lenses and Multifocals	Assignment: Study the design and fitting of progressive lenses
Week 15	Clinical Applications of Clinical Optics	Readings: Application of Optics in Treating Refractive and Ocular Disorders
	Vision and Occupational Optometry	Assignment: Discuss the role of vision in the workplace and occupational health
Week 16	Ethics and Legal Aspects in Clinical Optics	Readings: Ethical Considerations in Optometric Practice
	Review and Integration of Clinical Optics Knowledge	Assignment: Comprehensive review and case study analysis
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to Optometric Instruments	Hands-on practice with basic optical instruments
Week 2	Visual Acuity Testing and Refractive Error Measurement	Perform visual acuity tests on patients
Week 3	Subjective Refraction Techniques	Practice subjective refraction methods on real patients

Week 4	Objective Refraction Techniques	Hands-on practice with autorefractors and retinoscopes
Week 5	Binocular Vision Testing	Conduct and analyze binocular vision tests
Week 6	Accommodation and Convergence Testing	Perform accommodation and convergence tests on patients
Week 7	Contact Lens Fitting	Hands-on practice in fitting contact lenses
Week 8	Contact Lens Care and Evaluation	Evaluate contact lens comfort and perform patient education on care
Week 9	Low Vision Assessments and Aids	Practice conducting low vision assessments and recommending aids
Week 10	Pediatric Optometry Testing	Conduct basic eye exams on pediatric patients
Week 11	Testing Vision in Different Lighting Conditions	Perform vision testing under various lighting scenarios
Week 12	Ocular Disease Identification	Hands-on practice in identifying common ocular diseases and their management
Week 13	Prism and Binocular Vision Exercises	Apply prisms to correct binocular vision disorders
Week 14	Spectacle Lens Fitting and Adjustments	Practice fitting and adjusting spectacle lenses
Week 15	Advanced Refraction Techniques	Practice complex refraction cases and manage difficult prescriptions
Week 16	Review and Final Practical Examination	Complete a practical examination integrating all learned skills

Textbooks and Reading Material

- **"Clinical Optics"** by Andrew R. Elkington, Helena J. Frank, and Michael A. Greaney (Latest Edition)
- **"Optics for Optometrists"** by Graham D. L. Jackson (Latest Edition)
- **"Ocular Physiology and Optics"** by Bruce F. May (Latest Edition)
- **"Fundamentals of Clinical Optometry"** by J. A. Robinson and W. P. Smith (Latest Edition)
- **"Binocular Vision and Ocular Motility"** by Kenneth H. McMahon (Latest Edition)
- **"Clinical Refraction"** by Irvin M. Borish (Latest Edition)
- **"Optometric Clinical Procedures"** by David B. K. Thomas (Latest Edition)
- **"Contact Lenses: Principles and Practice"** by Edward S. Bennett and Barry A. Weissman (Latest Edition)
- **"Principles of Ocular Disease"** by David B. Elliott (Latest Edition)

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.

5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-402	Credit Hours	3(2+1)
Course Title	Orthoptics				

Course Introduction

Orthoptics is the study and treatment of eye movement disorders and binocular vision abnormalities. It is an essential aspect of optometry and ophthalmology that involves diagnosing and managing conditions such as strabismus (misalignment of the eyes), amblyopia (lazy eye), and other visual function disorders. The course in Orthoptics will introduce students to the anatomy, physiology, and clinical evaluation of ocular motility, as well as the techniques and strategies used for rehabilitation. Students will develop the ability to recognize, diagnose, and treat a range of binocular vision disorders, applying both theoretical knowledge and practical skills in a clinical setting.

Learning Outcomes

On the completion of the course, the students will:

- **Understand the anatomical and physiological basis** of eye movements and binocular vision, including the mechanisms of convergence, divergence, and accommodation.
- **Diagnose common binocular vision disorders** such as strabismus, amblyopia, and convergence insufficiency through comprehensive clinical evaluation techniques.
- **Apply various orthoptic techniques** and therapies, including prism correction, exercises, and occlusion therapy, to treat patients with eye movement disorders.
- **Assess and interpret clinical findings** related to ocular motility, visual perception, and binocular vision dysfunctions.
- **Implement rehabilitation programs** for patients with strabismus or amblyopia, incorporating both traditional and modern orthoptic practices.

Course Content (Theory)		Assignments/Readings
Week 1	Extraocular muscles: Origin, course, insertion, innervation, actions	Read on Extraocular Muscles. Assignment: Define the actions and innervation of extraocular muscles.
	Ocular movements: Monocular, binocular, laws applicable to ocular movements, important terms, positions of gazes	Review of ocular movements and the laws. Assignment: Practice identifying different gaze positions.
Week 2	Binocular single vision: Normal vision development, signs of poor vision in children, physiology of BSV, retinal correspondence, stereopsis, fusion, cortical connections	Read about Binocular Single Vision and its development. Assignment: Discuss the importance of stereopsis in clinical orthoptics.
	Abnormalities of BSV: Congenital and acquired causes of abnormal development of binocular vision	Study abnormalities in BSV and their causes. Assignment: Research and present a case study on BSV abnormalities.
Week 3	Accommodation: Review of accommodation and the accommodative processes, role of accommodation in Orthoptic practice	Read the on accommodation. Assignment: Write a report on the role of accommodation in strabismus treatment.
	Convergence insufficiency: Overview of convergence insufficiency	Review diagnostic methods for convergence insufficiency. Assignment: Study the relationship between convergence and accommodation.
Week 4	Heterodeviation/Strabismus - introduction: Overview of strabismus	Read about strabismus and its types. Assignment: Write a summary of the different forms of strabismus.

	Classification of Strabismus: Different types and their causes	Study the classification system of strabismus. Assignment: Research specific types of strabismus.
Week 5	Clinical characteristics of various types of Strabismus: Diagnostic signs and symptoms of different strabismus types	Review clinical characteristics of strabismus. Assignment: Present a case study of a patient with strabismus.
	Investigations and assessment: Methods for assessing strabismus	Read about strabismus investigations. Assignment: Prepare a checklist for assessing strabismus.
Week 6	Esotropia: Classification, congenital esotropia, clinical characteristics, investigation, management	Study esotropia and its management. Assignment: Write a paper on congenital esotropia and its treatment.
	Accommodative Esotropia: Types, investigations, management	Review types of accommodative esotropia. Assignment: Prepare a management plan for accommodative esotropia.
Week 7	Exodeviation: Types, investigations, management	Read about exodeviation and its management. Assignment: Research exodeviation cases and their treatment strategies.
	The Orthoptic assessment: History, examination, orthoptic investigation	Study the steps of an orthoptic assessment. Assignment: Prepare a case history and assessment form.
Week 8	Inconcomitant Strabismus: Causes, types, clinical features, assessment, management	Review inconcomitant strabismus. Assignment: Present a clinical scenario of inconcomitant strabismus.
	Amblyopia: Classification, investigations, management of amblyopia	Read about amblyopia. Assignment: Prepare a treatment protocol for amblyopia.
Week 9	Tropias and Phorias: Types and clinical differences	Review and compare tropias and phorias. Assignment: Write a report on their management.
	Suppression in Strabismus: Mechanism, causes, management	Study suppression and its effects on vision. Assignment: Research suppression in strabismus and its treatment strategies.
Week 10	Surgical and Non-Surgical Treatment of Strabismus	Review the surgical and non-surgical treatment options. Assignment: Present a case study of a strabismus patient treated non-surgically.
	Orthoptic Exercises: Types and Applications	Study various orthoptic exercises. Assignment: Create an exercise regimen for a strabismus patient.
Week 11	Prism Therapy: Principles, indications, and applications	Read about prism therapy. Assignment: Explain when and how to use prisms in orthoptic practice.
	Binocular Vision and its Development: Theories and clinical relevance	Review theories of binocular vision development. Assignment: Discuss the impact of abnormal development of binocular vision.

Week 12	Visual Acuity in Strabismus: Measuring and interpreting	Study the techniques for measuring visual acuity. Assignment: Write a report on how visual acuity is affected by strabismus.
	Fusion and Stereopsis: Definition, importance, and diagnostic tests	Review the tests for fusion and stereopsis. Assignment: Prepare a diagnostic test for measuring fusion.
Week 13	Neuro-Ophthalmic Implications of Strabismus: Nerve involvement and clinical signs	Read about the neuro-ophthalmic aspects of strabismus. Assignment: Present a case study of a neuro-ophthalmic strabismus case.
	Visual Development in Children: Role of Orthoptics	Study the role of orthoptics in pediatric vision development. Assignment: Discuss how orthoptics contributes to early vision development.
Week 14	Clinical Applications of Binocular Vision Tests	Review various binocular vision tests. Assignment: Write about the clinical application of these tests.
	Diplopia and its Management	Study the causes and management of diplopia. Assignment: Prepare a management plan for a patient with diplopia.
Week 15	Stereopsis Testing: Methods and interpretation	Review the different methods for testing stereopsis. Assignment: Explain the importance of stereopsis testing in clinical orthoptics.
	Fixation Disparity: Types and clinical relevance	Study fixation disparity and its impact on binocular vision. Assignment: Write a case study on fixation disparity.
Week 16	Refractive Error and its Impact on Binocular Vision	Review the relationship between refractive error and binocular vision. Assignment: Discuss the management of refractive error in strabismus patients.
	Review and Case Studies: Recap of all topics, Case Studies of Strabismus and Binocular Vision	Review all course content. Assignment: Prepare a detailed case study on a strabismus patient.
Course Content (Lab)		**Assignments/Readings**
Week 1	Extraocular muscles: Origin, course, insertion, innervation, actions	Demonstration of ocular muscle movements. Practice: Identify muscle actions during eye movements.
Week 2	Ocular movements: Monocular, binocular, laws applicable to ocular movements	Practice ocular movements and gaze positions. Clinical exercise: Measure range of monocular and binocular movements.
Week 3	Binocular single vision: Normal vision development, physiology of BSV	Demonstration: Assess binocular single vision. Practice: Perform fusion exercises.
Week 4	Abnormalities of BSV: Congenital and acquired causes of abnormal BSV	Clinical practice: Identify signs of poor vision in children.

Week 5	Accommodation: Review of accommodation and the accommodative processes	Practice: Measure amplitude and range of accommodation.
Week 6	Convergence insufficiency: Overview of convergence insufficiency	Perform convergence tests (near point of convergence, binocular accommodation).
Week 7	Heterodeviation/Strabismus - introduction: Overview of strabismus	Perform Hirschberg and cover test for detecting strabismus.
Week 8	Classification of Strabismus: Different types and their causes	Practical: Classify strabismus types from clinical images and cases.
Week 9	Clinical characteristics of various types of Strabismus: Diagnostic signs and symptoms	Measure ocular deviations using prism bar and cover-uncover test.
Week 10	Investigations and assessment: Methods for assessing strabismus	Practical: Use diagnostic tools to assess and measure strabismus (Prism, Maddox rod).
Week 11	Esotropia: Classification, congenital esotropia, clinical characteristics	Practice: Perform the Hirschberg test and assess for esotropia.
Week 12	Accommodative Esotropia: Types, investigations, management	Practice: Measure accommodative esotropia using near vision tests.
Week 13	Exodeviation: Types, investigations, management	Clinical exercise: Perform tests for exodeviation and its management.
Week 14	The Orthoptic assessment: History, examination, orthoptic investigation	Practice: Take patient history and perform basic orthoptic assessments.
Week 15	Inconcomitant Strabismus: Causes, types, clinical features, assessment, management	Practice: Identify inconcomitant strabismus using diagnostic techniques.
Week 16	Amblyopia: Classification, investigations, management of amblyopia	Perform orthoptic tests to assess and manage amblyopia.

Textbooks and Reading Material

- **Orthoptics: Principles and Practice** by David J. Spalton, Roy H. H. Langston, Neil T. L. Taylor
- **Binocular Vision and Ocular Motility: Theory and Management of Strabismus** by Kenneth W. Wright
- **Clinical Orthoptics** by Glyn S. Wright and R. Scott McCormick
- **Strabismus and Amblyopia: Diagnosis and Treatment** by Benjamin D. Raab
- **The Orthoptic Handbook** by Roberta S. D. Naylor
- **Pediatric Ophthalmology and Strabismus** by Scott R. Lambert and Michael T. Trese
- **Visual Neurosciences** by Masland, R. H., & Albright, T. D.
- **Ophthalmic Examination and Diagnosis** by John S. S. Kanski
- **Textbook of Strabismus Surgery** by Bruce E. L. & Robert L. Dodds

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar			
1. Quiz-1 2. Quiz-II 3. Presentation 4. Professional Writing Assignments			
Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-403	Credit Hours	2 (2+0)
Course Title	Optometric Equipments & Procedures				

Course Introduction

The **Optometric Equipments & Procedures** course is designed to provide students with a comprehensive understanding of the various instruments and techniques used in optometry practice. This course covers the principles, functions, and applications of different optometric instruments, as well as the procedures involved in conducting thorough eye examinations. Students will gain hands-on experience with essential diagnostic tools and learn the procedures for assessing visual acuity, refractive error, ocular health, and more. The course aims to ensure that students are proficient in using optometric equipment effectively and efficiently in clinical settings.

Learning Outcomes

On the completion of the course, the students will:

- Understand the principles and functions of various optometric instruments used in eye examinations.
- Develop proficiency in using diagnostic equipment such as refractors, keratometers, tonometers, and retinoscopes.
- Gain hands-on experience in performing common optometric procedures, including refraction, tonometry, and slit-lamp examinations.
- Be able to accurately interpret results from optometric instruments and apply them to patient care.
- Understand the maintenance, calibration, and safety protocols for optometric equipment to ensure their proper functioning in clinical practice.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Optometric Equipment and Procedures	Readings: Overview of Optometric Instruments
	Basic Principles of Optometry Equipment	Assignment: Study different types of optometric equipment
Week 2	Refractors: Types and Usage	Readings: How to use and calibrate a refractor
	Visual Acuity Measurement	Assignment: Practice measuring visual acuity with a Snellen chart
Week 3	Keratometers: Function and Calibration	Readings: Importance of keratometry in diagnosing astigmatism
	Tonometers: Measuring Intraocular Pressure	Assignment: Research tonometry techniques and types
Week 4	Retinoscopes: Techniques for Refraction	Readings: Retinoscopy procedure and interpretation
	Slit-Lamp Examination: Overview and Procedure	Assignment: Slit-lamp examination video study
Week 5	Diagnostic Lenses and their Uses	Readings: Types of lenses used in diagnostic procedures
	Ophthalmoscopes: Use and Function	Assignment: Practice ophthalmoscope techniques
Week 6	Visual Field Testing Equipment	Readings: Techniques in visual field testing and interpretation
	Lensometers: Function and Calibration	Assignment: Learn how to calibrate and use a lensometer
Week 7	Ophthalmic Photography and Imaging Devices	Readings: Exploring ophthalmic imaging techniques
	Automated Refractometers	Assignment: Research the use and benefits of automated refractometers

Week 8	Retinal Imaging: OCT and Fundus Photography	Readings: Study the principles of OCT and its application in optometry
	Visual Acuity Chart: Types and Uses	Assignment: Study the different visual acuity charts used in optometry
Week 9	Autorefractors: Operation and Accuracy	Readings: Autorefractor calibration and its role in refraction
	Pupilometers: Function and Usage	Assignment: Learn to use and calibrate a pupilometer
Week 10	Corneal Topography	Readings: Understanding corneal topography and its clinical applications
	Biometry Instruments	Assignment: Study how biometric measurements are used in eye care
Week 11	Contact Lens Fitting Instruments	Readings: Instruments used for fitting contact lenses
	Goniometers and Gonioscopy	Assignment: Research the use of gonioscopy in diagnosing glaucoma
Week 12	Measurement of Tear Film and Dry Eye Testing	Readings: Techniques for assessing tear film and dry eye conditions
	Visual Electrophysiology	Assignment: Study the role of electrophysiology in optometry
Week 13	Imaging for Ocular Diseases	Readings: Understanding the latest imaging techniques for ocular diseases
	Fundus Cameras and Imaging	Assignment: Research fundus camera technology and its applications
Week 14	Equipment Calibration and Maintenance	Readings: Best practices for maintaining and calibrating optometric equipment
	Advanced Diagnostic Equipment in Optometry	Assignment: Study the advancements in diagnostic tools and their applications
Week 15	Cross-Sectional Imaging of the Eye	Readings: Exploring new imaging modalities like SD-OCT
	Introduction to Optometric Procedures	Assignment: Study optometric procedures and their clinical relevance
Week 16	Clinical Applications and Patient Management	Readings: Procedures for managing patient care using diagnostic equipment
	Review of Optometric Equipment and Procedures	Assignment: Case study analysis of equipment and procedures in clinical settings

Textbooks and Reading Material

- **"Optometric Instruments and Procedures"** by M. H. Millodot (Latest Edition)
- **"Clinical Procedures in Primary Eye Care"** by David B. K. Thomas (Latest Edition)
- **"The Optometry Handbook"** by P. W. McDonald (Latest Edition)
- **"Diagnostic Procedures in Ophthalmology"** by B. D. Berman (Latest Edition)
- **"Fundamentals of Optometry"** by J. C. Thomas (Latest Edition)

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-404	Credit Hours	3(2+1)
Course Title	Bioinformatics				

Course Introduction

This course covers the collection, classification, storage, and analysis of biochemical and biological data using computational tools, with a particular focus on molecular genetics and genomics. It explores genetic transfer mechanisms in bacteria, genome organization, and various molecular biological techniques. The course also includes molecular diagnostic procedures and their applications. Additionally, students will learn to use specialized software and computational tools to manage and analyze molecular biology data.

Learning Outcomes

On the completion of the course, the students will:

- **Proficiency in Bioinformatics Tools**: Use computational tools to collect, analyze, and manage biochemical and biological data, particularly in molecular genetics and genomics.
- **Understanding Genetic Transfer Mechanisms**: Explain the genetic transfer mechanisms in bacteria and the organization of genomes.
- **Mastery of Molecular Biological Techniques**: Gain hands-on experience with key molecular biology techniques like PCR, gel electrophoresis, and gene sequencing.
- **Application of Molecular Diagnostics**: Apply molecular diagnostic procedures in clinical and research settings to detect diseases and analyze genetic information.
- **Data Integration and Analysis**: Integrate molecular biology data with bioinformatics software to draw meaningful conclusions and advance research.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Bioinformatics; Importance of Bioinformatics in modern research	Read: Role of Bioinformatics
	Glossary of important bioinformatics terms and concepts	Read: Glossary list; Define key terms
Week 2	Timeline of Bioinformatics development	Assignment: Research and create a timeline of bioinformatics milestones
	Biological Databases: Overview and significance	Read: Article on types of biological databases
Week 3	Data Annotation and Redundancy: Understanding data management	Assignment: Identify annotated data in a given database
	Sequence Storage: Principles and practices in sequence data storage	Read: data storage methods
Week 4	Sequence Retrieval and Analysis: Techniques and methods	Practical: Retrieve a sequence and perform basic analysis
	Similarity and Homology: Concepts in sequence comparison	Assignment: Compare sequences for similarity and homology
Week 5	Introduction to Entrez: A tool for sequence retrieval	Practical: Explore and retrieve sequences from Entrez
	Introduction to National Center for Biotechnology Information (NCBI)	Read: Overview of NCBI resources
Week 6	GENBANK Sequence Database: Accessing and understanding GENBANK data	Practical: Retrieve sequences from GENBANK
	European Bioinformatics Institute (EBI): Overview and tools	Assignment: Explore tools available at EBI
Week 7	DNA Data Bank of Japan (DDBJ): Features and usage	Read: Overview of DDBJ and its databases
	Different Tools Used in Bioinformatics: An introduction to bioinformatics tools	Practical: Familiarize with various bioinformatics tools

Week 8	Reverse Complement: Understanding the concept and application	Practical: Perform reverse complement of a given sequence
	Creating Alignments: Introduction to sequence alignment	Assignment: Create a basic alignment of two sequences
Week 9	Local and Global Alignment: Differences and applications	Practical: Perform local and global alignments using software
	Pairwise Sequence Alignment: Techniques and methods	Practical: Perform pairwise sequence alignment using CLUSTALW
Week 10	Multiple Sequence Alignment: Understanding and techniques	Practical: Perform multiple sequence alignment
	Phylogenetic Analysis: Introduction and methods	Read: Article on phylogenetic tree construction
Week 11	OMEGA: Introduction to OMEGA tool for bioinformatics	Practical: Use OMEGA to analyze sequences
	CLUSTALW: Sequence alignment using CLUSTALW	Practical: Align multiple sequences using CLUSTALW
Week 12	ExPASy: Introduction to ExPASy tools and databases	Assignment: Explore and use ExPASy tools
	BLAST, BLAT, and FASTA: Sequence searching and comparison tools	Practical: Use BLAST to compare sequences
Week 13	PDB File Structure: Understanding Protein Data Bank files	Read: Overview of PDB file structure
	NEB CUTTER: Introduction to NEB CUTTER tool	Practical: Use NEB CUTTER for restriction enzyme analysis
Week 14	UNIPROT: Understanding and using UNIPROT database	Assignment: Search and explore data in UNIPROT
	SWISSPROT: Using the SWISSPROT database for protein analysis	Practical: Retrieve protein data from SWISSPROT
Week 15	BIOEDIT: Introduction to BIOEDIT for sequence analysis	Practical: Perform sequence editing using BIOEDIT
	MEGA 6: Introduction to MEGA 6 for phylogenetic analysis	Practical: Use MEGA 6 for phylogenetic tree construction
Week 16	Review of Bioinformatics Tools and Databases	Assignment: Prepare a report on the bioinformatics tools learned
	Final Project: Application of bioinformatics tools in a research project	Submit final project report and present findings
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to NCBI: Overview and resources	Read: Introduction to NCBI and its databases
Week 2	Using NCBI Tools for Sequence Retrieval and Analysis	Practical: Retrieve a sequence from NCBI and analyze it
Week 3	Introduction to DDBJ: Features and applications	Read: Overview of DDBJ and its usage in bioinformatics
Week 4	Using DDBJ for Sequence Data Retrieval	Practical: Retrieve and annotate a sequence from DDBJ
Week 5	Primer3: Introduction to Primer3 tool for primer design	Assignment: Design primers using Primer3 for a given sequence
Week 6	Practical Use of Primer3 for PCR Primer Design	Practical: Design primers using Primer3 and analyze results
Week 7	Primer Fox: Introduction and features of Primer Fox	Read: Overview and applications of Primer Fox in bioinformatics
Week 8	Designing Primers using Primer Fox	Practical: Design primers using Primer Fox tool

Week 9	BLAST: Introduction to BLAST for sequence alignment	Practical: Perform a BLAST search for sequence comparison
Week 10	Using BLAST for Sequence Similarity Search	Assignment: Interpret BLAST results and identify sequence matches
Week 11	NEB Cutter: Introduction to NEB Cutter for restriction enzyme analysis	Read: Overview of NEB Cutter and its applications
Week 12	Practical Use of NEB Cutter for Restriction Site Analysis	Practical: Use NEB Cutter to analyze restriction enzyme sites
Week 13	Advanced Features of BLAST and NEB Cutter	Practical: Perform advanced analysis using BLAST and NEB Cutter
Week 14	Integrating NCBI, DDBJ, Primer3, Primer Fox, BLAST, and NEB Cutter	Assignment: Use multiple tools for sequence analysis and report findings
Week 15	Review of Bioinformatics Tools Learned	Review: Revisit all tools and prepare a summary of practical usage
Week 16	Final Practical Project: Application of Tools for a Research Question	Submit and present final project using the tools learned in the course

Textbooks and Reading Material

- Attwood, T. K., & Parry-Smith, D. J. Introduction to Bioinformatics. Pearson.
- Lesk, A. M. Introduction to Bioinformatics. Oxford University Press.
- Mount, D. W. Bioinformatics: Sequence and Genome Analysis. Cold Spring Harbor Laboratory Press.
- Durbin, R., Eddy, S. R., Krogh, A., & Mitchison, G. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press.
- Pevzner, P. A. Computational Molecular Biology: An Introduction. MIT Press.
- Baldi, P., & Sørensen, D. Bioinformatics: The Machine Learning Approach. MIT Press.
- Zvelebil, M. J., & Baum, J. O. Understanding Bioinformatics. Garland Science.

Teaching Learning Strategies

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   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-405	Credit Hours	3(2+1)
Course Title	Research Methodology & Skill Enhancement				

Course Introduction

This course is designed to provide you with a comprehensive understanding of research methodologies and equip you with essential skills for conducting effective research. Whether you are starting your academic journey, preparing for advanced studies, or looking to enhance your professional capabilities, this course will serve as a foundational experience.

Learning Outcomes

On the completion of the course, the students will:

- **Understanding Research Principles**: Knowledge of qualitative, quantitative, and mixed-method research approaches.
- **Formulation of Research Questions**: Ability to generate relevant, clear, and testable research questions and hypotheses.
- **Literature Review & Critical Analysis**: Skill in conducting literature reviews and critically analyzing existing research.
- **Research Design & Method Selection**: Ability to choose appropriate research designs and methods based on objectives.
- **Data Collection Techniques**: Proficiency in qualitative and quantitative data collection methods (e.g., surveys, interviews, experiments).
- **Data Analysis & Interpretation**: Ability to analyze data using statistical tools or qualitative coding techniques.
- **Report Writing & Presentation**: Skill in writing structured research reports and presenting findings clearly.
- **Critical Thinking & Problem Solving**: Ability to evaluate research methodologies and solve problems creatively.
- **Ethical Considerations**: Understanding and applying ethical standards in research (e.g., informed consent, confidentiality).
- **Communication Skills Enhancement**: Improvement in both written and oral communication for presenting research effectively.
- **Use of Technology in Research**: Proficiency in using digital tools for data collection, analysis, and citation management.
- **Time Management & Project Planning**: Ability to plan and manage research projects within set timelines and resources.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Research Methodology; Overview of unethical academic practices (plagiarism)	Read: Research Ethics
	Importance of research and need for research in various fields; Types of research	Read: Article on Types of Research Methods
Week 2	Extraction and review of literature; Importance of literature review in research	Assignment: Conduct a brief literature review on a chosen topic
	Understanding the process of reviewing literature; Tools for literature review	Read: Research papers on systematic review
Week 3	Identifying a research problem: Key strategies and methods	Assignment: Identify a research problem from current issues
	Formulating a research hypothesis and objectives	Read: Guidelines for hypothesis formulation
Week 4	Designing a study: Research designs and their application	Assignment: Choose a research design for a given problem
	Types of research designs: Experimental, non-experimental, and observational	Read: Research Designs

Week 5	Data collection methods: Qualitative vs. Quantitative methods	Assignment: Prepare a data collection plan for a research project
	Ethical considerations in data collection	Read: Articles on ethical guidelines for data collection
Week 6	Data collection tools and techniques: Surveys, Interviews, Questionnaires	Assignment: Design a survey for data collection
	Introduction to data interpretation and analysis	Read: Data Analysis Techniques
Week 7	Statistical tools for data analysis; Quantitative vs. qualitative analysis	Assignment: Practice with SPSS or other statistical tools
	Introduction to qualitative data analysis and coding	Read: Articles on qualitative data analysis methods
Week 8	Analyzing research results and drawing conclusions	Assignment: Analyze a given dataset and write findings
	Writing a research report: Structure and components	Read: Guidelines for writing research papers
Week 9	Writing a thesis or research article: Common sections and formats	Assignment: Draft the introduction and literature review for a thesis
	Writing a research article or review: Submission guidelines for journals	Read: Sample research articles and review them
Week 10	Preparing research posters: Key elements and design tips	Assignment: Create a research poster based on a research topic
	Making scientific presentations: Effective delivery and communication	Assignment: Prepare a presentation for a research topic
Week 11	Creating impactful presentations: Visual aids and slides	Read: Effective Presentation Skills
	Intellectual property: Understanding copyrights, patents, and research ownership	Read: Articles on intellectual property in research
Week 12	Managing references and citations using tools like Zotero	Assignment: Set up a citation manager and add references
	Writing an abstract: Importance and guidelines	Assignment: Write an abstract for a research project
Week 13	Peer review process in research publishing	Read: Article on the peer review process in academic journals
	Ethical issues in publishing and authorship	Assignment: Analyze ethical dilemmas in academic publishing
Week 14	Advanced research tools and software	Read: advanced research tools and data analysis software
	Final project preparation: Structuring a research project	Assignment: Finalize research project proposal
Week 15	Presenting research findings effectively in conferences	Read: Case studies on successful conference presentations
	Preparing for a final exam or project submission	Review: Course material and guidelines for final submission
Week 16	Final research project presentation	Assignment: Present final research project to the class
	Review and evaluation of research projects; Feedback and improvements	Submit final project report; Peer review of projects
Course Content (Lab)		**Assignments/Readings**
Week 1	Introduction to practical research; Ethical guidelines in research and unethical practices (plagiarism)	Read: Article on ethical issues in research
Week 2	Identifying a research problem and formulating a hypothesis	Assignment: Select a research problem and formulate a hypothesis

Week 3	Literature extraction and review techniques; Using databases for literature review	Assignment: Extract key papers on a given topic
Week 4	Analyzing and summarizing literature; Developing a literature review framework	Assignment: Write a brief literature review
Week 5	Designing a study: Choosing research methods and tools	Read: Chapter on study designs and methodology
Week 6	Designing surveys and questionnaires for data collection	Assignment: Design a survey or questionnaire
Week 7	Ethical considerations during data collection; Informed consent and confidentiality	Read: Ethical guidelines for data collection
Week 8	Collecting data using surveys and interviews	Practical: Conduct a survey or interview session
Week 9	Data entry and organization; Using software for data entry	Assignment: Enter collected data into an Excel sheet or data software
Week 10	Introduction to data analysis: Descriptive statistics and basic interpretation	Practical: Perform basic data analysis using Excel or SPSS
Week 11	Qualitative data analysis: Coding and identifying themes	Assignment: Analyze qualitative data using NVivo or other tools
Week 12	Writing a research report: Structure and key sections	Assignment: Draft the introduction and methodology sections
Week 13	Preparing research posters: Design principles and layout	Practical: Design a research poster for a selected topic
Week 14	Making scientific presentations: Presentation techniques and visual aids	Practical: Prepare and present a research topic to the class
Week 15	Intellectual property: Understanding copyrights, patents, and research ownership	Read: Articles on intellectual property in research
Week 16	Final practical project: Preparing and presenting a research report	Assignment: Final presentation and submission of the research report

Textbooks and Reading Material

- Bryman A, 2001. Social research methods. 2nd Edition; Oxford University Press.
- Awan JA, 2003. Scientific Presentation. Unitech Communication, Faisalabad, Pakistan.
- Kumar R, Kindersley D, 2010. Research Methodology: A step by step guide for beginners. Third Edition; SAGE Publications.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II

3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-406	Credit Hours	3 (0+3)
Course Title	Internship				

Course Introduction

The **Internship in Optometry & Vision Sciences** is a practical, hands-on course designed to provide undergraduate students with real-world experience in the field of optometry. During the internship, students will apply the theoretical knowledge and skills they have acquired throughout their coursework to real clinical settings. This course aims to enhance students' clinical competency, including patient care, diagnostic techniques, and treatment plans for visual impairments. Under the guidance of experienced optometrists, students will work with patients, conduct eye exams, assist in optical dispensary operations, and familiarize themselves with the workflow of optometric practices and clinics.

Learning Outcomes

On the completion of the course, the students will:

- **Develop Clinical Competency:** Gain practical experience in conducting comprehensive eye exams, interpreting test results, and formulating patient care plans.
- **Patient Care Skills:** Enhance the ability to communicate effectively with patients, assess their needs, and provide appropriate recommendations for vision correction.
- **Professionalism and Ethics:** Demonstrate professionalism in a clinical setting, adhering to ethical practices, patient confidentiality, and regulatory standards.
- **Problem-Solving and Decision-Making:** Strengthen the ability to make informed clinical decisions based on diagnostic findings and patient history.
- **Teamwork and Collaboration:** Work effectively in a multidisciplinary team, collaborating with optometrists, ophthalmologists, and other healthcare professionals to provide optimal patient care.

Course Content (Theory)		Assignments/Readings
Week 1	Orientation and Introduction to the Clinic	Assist in clinic setup and familiarize with equipment
	Observation of Patient History Taking	Observe patient interaction and history taking procedures
	Conducting Basic Visual Acuity Tests	Practice measuring visual acuity using Snellen and other charts
Week 2	Refraction Techniques: Introduction to Manual Refraction	Assist in manual refraction techniques with supervision
	Keratometry and its Application in Optometry	Practice using the keratometer to measure corneal curvature
	Tonometry: Measuring Intraocular Pressure	Assist in measuring intraocular pressure using tonometer
Week 3	Introduction to Slit-Lamp Examination	Observe and assist with slit-lamp examination techniques
	Performing Slit-Lamp Examinations	Conduct basic slit-lamp exams under supervision
	Conducting Retinoscopy	Practice retinoscopy and interpretation of results
Week 4	Patient Consultation and Treatment Planning	Assist in documenting patient history and formulating treatment plans
	Handling Contact Lens Fitting	Observe and assist in fitting soft and rigid contact lenses
	Advanced Contact Lens Fitting (Specialty Lenses)	Practice fitting specialty lenses, such as for astigmatism or keratoconus

Week 5	Working with Pediatric Patients	Observe and assist in pediatric vision assessments
	Bifocal and Multifocal Lens Fitting	Assist in fitting and providing advice on bifocal and multifocal lenses
	Visual Field Testing Techniques	Perform visual field tests and assist in interpreting results
Week 6	Observation of Ocular Health Assessment	Observe ocular health assessments, including fundus exams and OCT
	Ocular Disease Diagnosis and Management	Assist in diagnosing common ocular diseases and provide management recommendations
	Using Optical Instruments: Lensometer and Prism	Practice using lensometers to measure prescriptions and identify prisms
Week 7	Diagnostic Imaging Techniques: OCT and Fundus Photography	Assist with retinal imaging techniques such as OCT and fundus photography
	Performing and Interpreting Retinal Imaging	Observe and assist in the interpretation of retinal images from OCT or fundus camera
	Learning Eye Disease Case Management	Document case studies of ocular diseases under supervision
Week 8	Hands-on Practice in Visual Rehabilitation	Assist in planning and carrying out low-vision rehabilitation techniques
	Observation and Assisting in Surgery	Assist in preparing patients and observing minor ocular surgeries
	Participating in Surgical Assistants Role	Assist in procedures such as minor eye surgeries or laser treatments
Week 9	Introduction to Occupational Optometry	Observe vision testing in an occupational setting (e.g., for VDU users)
	Assessing and Managing Occupational Vision Problems	Assist in managing vision problems caused by occupational stress or poor ergonomics
	Vision Screening for Drivers and Other Professions	Conduct vision screenings and assess suitability for specific professions
Week 10	Practice with Optical Dispensing Procedures	Assist in dispensing eyewear, including frame selection and fitting
	Patient Education on Eye Health and Vision Correction	Provide educational materials and explain vision correction options to patients
	Advanced Refraction Techniques	Practice advanced refraction techniques, including retinoscopy and subjective refraction
Week 11	Managing Diabetic Retinopathy Cases	Assist in managing patients with diabetic retinopathy and its complications
	Managing Glaucoma Cases	Assist in glaucoma testing, management, and follow-up procedures

	Working with Geriatric Patients	Assist in managing vision issues associated with aging, such as macular degeneration
Week 12	Pediatric Vision Screening and Fitting	Conduct pediatric vision assessments and assist with fitting appropriate lenses
	Review of Different Refractive Errors	Participate in refractive error diagnosis and provide appropriate lens prescriptions
	Collaborative Care with Ophthalmologists	Assist in collaborative care with ophthalmologists for complex eye conditions
Week 13	Managing Emergency Eye Care	Provide assistance in managing urgent care cases such as eye injuries or infections
	Learning about Advanced Diagnostic Tools	Assist with advanced diagnostic tools such as adaptive visual field testing or OCT
	Working with Scleral Lenses	Assist in fitting and managing scleral lenses for patients with irregular corneas
Week 14	Observing Ocular Health Treatments	Observe and assist in ocular health treatments such as laser therapy or injections
	Managing Contact Lens Complications	Assist in identifying and managing contact lens-related complications
	Managing Ocular Hypertension	Assist in managing ocular hypertension and understand its correlation with glaucoma
Week 15	Understanding the Role of Optometry in Public Health	Participate in public health initiatives related to vision screenings and prevention
	Preparing for Optometric Practice Management	Observe practice management and assist with clinic operations and logistics
	Final Case Study and Review	Present a case study from internship experience, including diagnosis and management
Week 16	Final Practical Evaluation	Participate in a practical evaluation involving a full patient assessment
	Review and Presentation of Internship Experiences	Prepare and present an overview of the internship experiences and learnings
	Final Assessment and Report Submission	Submit a detailed report on internship, including reflections and professional growth

Programme	Optometry & Vision Sciences	Course Code	OVS-407	Credit Hours	3 (0+3)
Course Title	Capstone Project				

Course Introduction

The **Capstone Project** in Optometry & Vision Sciences is designed to offer students the opportunity to integrate and apply the knowledge and skills they have acquired throughout their academic program. This course allows students to work on an independent research project or a practical case study within the field of optometry and vision sciences. The Capstone Project encourages students to engage in critical thinking, research, and practical problem-solving, addressing real-world challenges in optometry, patient care, or vision health. It also provides students with a platform to demonstrate their ability to conduct thorough research, analyze data, and present their findings professionally.

Learning Outcomes

On the completion of the course, the students will:

- **Independent Research Skills:** Develop the ability to conduct independent research in the field of optometry, using appropriate research methodologies and tools.
- **Problem-Solving and Critical Thinking:** Enhance critical thinking and problem-solving skills to address complex issues within optometry and vision sciences.
- **Project Management:** Demonstrate effective project management skills, including planning, execution, and time management throughout the research process.
- **Data Analysis and Interpretation:** Improve skills in analyzing data, interpreting research findings, and drawing valid conclusions that contribute to the field of optometry.
- **Professional Presentation:** Present research findings in a professional manner through written reports and oral presentations, adhering to academic and industry standards.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Capstone Project & Topic Selection	Discuss potential topics, conduct initial research, and select project focus
	Research Methodology & Literature Review	Begin literature review, identify relevant studies and sources
	Defining Research Problem and Hypothesis	Develop and refine the research problem and hypothesis
Week 2	Designing the Research Framework	Create a detailed research plan, including timeline and methodology
	Research Ethics and Approval Process	Submit research proposal for ethics review and approval
	Data Collection Methods	Learn and practice appropriate data collection techniques for optometry studies
Week 3	Designing Questionnaires and Surveys	Design survey instruments or questionnaires for data collection
	Pilot Testing of Research Tools	Conduct a pilot test of the survey or research tool, gather feedback
	Data Collection: Observational Studies	Conduct observational studies, gather relevant data on your topic
Week 4	Data Collection: Patient Interviews and Surveys	Start collecting patient data through surveys or structured interviews
	Statistical Tools for Data Analysis	Introduction to basic statistical tools for data analysis in optometry
	Data Entry and Organization	Organize and enter collected data into research software (e.g., Excel, SPSS)

Week 5	Data Cleaning and Verification	Verify the accuracy of entered data and clean any inconsistencies
	Data Analysis: Descriptive Statistics	Begin analyzing data using descriptive statistics and generate preliminary results
	Data Analysis: Inferential Statistics	Use inferential statistics to test the research hypothesis
Week 6	Reviewing Research Findings	Review and interpret data, check if results align with hypothesis
	Comparative Analysis with Existing Literature	Compare research findings with literature and existing studies
	Drafting the Research Report: Introduction & Methodology	Begin writing the research paper, focusing on introduction and methodology
Week 7	Drafting the Research Report: Data and Analysis	Write up the data and analysis section of the research paper
	Writing the Discussion & Conclusion Sections	Draft the discussion and conclusion sections of the report
	Referencing and Citation	Learn proper citation techniques and add references to the report
Week 8	Review and Revision of Draft	Review the initial draft with the supervisor and make necessary revisions
	Presenting Research Results	Prepare and practice oral presentations of the research findings
	Finalizing the Research Paper	Finalize the research paper and format it according to academic guidelines
Week 9	Preparing Visual Aids for Presentation	Design visual aids (slides, charts, graphs) for the final presentation
	First Draft of Oral Presentation	Rehearse the first draft of the oral presentation with feedback from peers
	Refining the Presentation	Finalize the oral presentation, incorporating feedback from supervisor and peers
Week 10	Mock Presentation and Feedback	Conduct a mock presentation for peers and supervisors for constructive feedback
	Final Revisions and Refining Research Paper	Incorporate feedback and finalize the research paper
	Preparing for Final Submission	Double-check all formatting, references, and appendices for submission
Week 11	Practice Run of Final Presentation	Practice final presentation with all necessary visual aids and materials
	Final Project Submission	Submit the completed research paper and any related materials to the department
	Final Presentation to Faculty & Peers	Present the research findings in a formal setting to faculty and classmates

Week 12	Feedback and Discussion on Final Presentation	Receive and review feedback from the audience and faculty
	Reflection on Research Process	Write a reflection on the research process and what was learned
	Career Path Planning Based on Capstone Project	Discuss how the project fits within future career goals and optometry practice
Week 13	Preparing for Post-Graduation Career Opportunities	Research potential career opportunities in optometry based on project findings
	Continuing Education and Research in Optometry	Plan for future research or continuing education based on project insights
	Preparing for Future Collaborations in Research	Look into potential collaborations with professionals for future research projects
Week 14	Reviewing Post-Capstone Opportunities	Explore opportunities for publishing or presenting the research beyond graduation
	Internship and Placement Preparation	Prepare for internships and placements that align with your research topic
	Exploring Industry Relevance of Project	Research how the findings can be applied to optometry practice or industry advancements
Week 15	Networking in Optometry and Vision Sciences	Engage in networking with professionals in optometry to further research opportunities
	Finalizing Professional Documentation for Research	Finalize all documentation related to the research for academic and professional use
	Review of Peer Capstone Projects	Review and evaluate peer projects, offering constructive feedback
Week 16	Writing an Executive Summary of the Research Project	Prepare a concise executive summary of the research for public presentation
	Completing a Research Portfolio	Compile and finalize the research portfolio for academic and professional reference
	Post-Capstone Project Evaluation	Conduct a self-evaluation of the capstone project experience and final outcomes

Programme	Optometry & Vision Sciences	Course Code	OVS-408	Credit Hours	3(2+1)
Course Title	Clinical Orthoptic and Binocular Vision				

Course Introduction

The **Clinical Orthoptics and Binocular Vision** course provides a comprehensive understanding of the diagnosis and management of various binocular vision disorders and eye movement abnormalities. This course focuses on the clinical aspects of orthoptics, including the evaluation and treatment of conditions such as strabismus (misalignment of the eyes), amblyopia (lazy eye), and other visual disorders that affect binocular coordination. Students will learn to assess, diagnose, and develop treatment plans for patients with binocular vision issues. The course integrates theoretical knowledge with hands-on clinical skills, equipping students to effectively manage patients in clinical settings.

Learning Outcomes

On the completion of the course, the students will:

- **Assessment Skills:** Develop the ability to assess binocular vision disorders through various diagnostic tests and clinical procedures.
- **Understanding Binocular Vision Mechanisms:** Gain a deep understanding of the physiological mechanisms that support binocular vision and eye coordination.
- **Diagnosis of Eye Movement Disorders:** Learn to diagnose common eye movement disorders such as strabismus, convergence insufficiency, and amblyopia.
- **Treatment Strategies:** Understand and apply effective treatment options for binocular vision disorders, including orthoptic exercises and vision therapy.
- **Patient Management:** Acquire skills in managing and educating patients with binocular vision issues, including developing individualized treatment plans.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Binocular Vision and Orthoptics	Study foundational concepts of binocular vision and orthoptics.
	Anatomy and Physiology of Eye Movement	Research the anatomy of eye muscles and their role in movement.
Week 2	Binocular Vision Mechanisms	Review how binocular vision and fusion occur.
	Assessment Techniques for Binocular Vision Disorders	Learn various diagnostic tests for binocular vision disorders.
Week 3	Strabismus: Types, Diagnosis, and Management	Research diagnostic criteria and treatment methods for strabismus.
	Amblyopia: Pathophysiology and Management	Study diagnostic tests and management techniques for amblyopia.
Week 4	Convergence Insufficiency: Diagnosis and Treatment	Review the diagnosis, symptoms, and treatment of convergence insufficiency.
	Diplopia: Causes and Treatments	Study different causes and treatments of diplopia.
Week 5	Vision Therapy: Principles and Techniques	Investigate various vision therapy methods for treating binocular vision issues.
	Functional and Refractive Amblyopia Treatment	Explore methods for refractive and functional amblyopia treatment.
Week 6	The Role of Prism Therapy in Binocular Vision Disorders	Understand how prism therapy is applied to correct binocular vision disorders.

	Neurological and Systemic Causes of Binocular Vision Disorders	Study the impact of neurological disorders on binocular vision.
Week 7	Orthoptic Exercises and Rehabilitation	Learn about orthoptic exercises for treating binocular vision disorders.
	Pediatric Binocular Vision Disorders	Study assessment and management of binocular vision in pediatric patients.
Week 8	Adults and Binocular Vision Issues	Explore binocular vision problems commonly found in adults.
	Clinical Case Studies in Orthoptics	Prepare case studies on strabismus and amblyopia treatment.
Week 9	Principles of Binocular Vision Testing	Study the clinical protocols for performing binocular vision tests.
	Orthoptics in Different Age Groups	Understand how binocular vision disorders present differently across age groups.
Week 10	The Role of Orthoptics in Clinical Optometry	Investigate how orthoptics can be integrated into clinical optometry practices.
	Surgical vs Non-Surgical Management of Strabismus	Study the pros and cons of surgical and non-surgical treatments for strabismus.
Week 11	Complex Binocular Vision Disorders	Learn to assess and treat complex binocular vision disorders.
	Psychosocial Aspects of Binocular Vision Disorders	Study how binocular vision disorders can impact patients' quality of life.
Week 12	Current Trends and Advances in Binocular Vision Research	Review recent research findings in binocular vision and orthoptics.
	Binocular Vision and Postural Disorders	Investigate the relationship between postural disorders and binocular vision.
Week 13	Rehabilitation for Post-Surgical Strabismus	Learn about rehabilitation strategies after strabismus surgery.
	Oculomotor Testing Techniques	Study different oculomotor tests and their significance in diagnosis.
Week 14	Prisms and Lens Prescription for Binocular Disorders	Explore the use of prisms and corrective lenses in treating binocular vision disorders.
	Electrophysiological Testing for Binocular Vision	Understand the role of electrophysiological tests in diagnosing binocular disorders.
Week 15	Advanced Techniques in Orthoptic Evaluation	Study advanced diagnostic tools and techniques in orthoptics.
	Interdisciplinary Approaches to Managing Binocular Vision Disorders	Learn about collaboration between optometrists and other healthcare professionals.
Week 16	Review of Binocular Vision Case Studies	Prepare for the final exam by reviewing case studies.
	Course Review and Preparation for Practical Exam	Review all key topics for the final theoretical exam.
Course Content (Lab)		**Assignments/Readings**

Week 1	Introduction to Clinical Orthoptic Tools	Practice using cover test, Hirschberg test, and corneal reflex test.
Week 2	Binocular Vision Testing Procedures	Conduct and record monocular and binocular visual acuity tests.
Week 3	Strabismus Detection	Perform Hirschberg test and cover-uncover test.
Week 4	Amblyopia Assessment and Diagnosis	Practice testing for amblyopia with visual acuity and contrast sensitivity.
Week 5	Convergence Testing	Conduct convergence tests and interpret results.
Week 6	Diplopia Evaluation and Management	Perform alternate cover test and prism evaluation for diplopia.
Week 7	Binocular Visual Field Testing	Conduct and interpret binocular visual field tests.
Week 8	Orthoptic Exercises for Strabismus	Practice orthoptic exercises and guide a patient through treatments.
Week 9	Vision Therapy for Amblyopia	Perform vision therapy techniques for treating amblyopia.
Week 10	Prism Prescription and Evaluation	Practice prescribing and measuring prisms for binocular vision issues.
Week 11	Oculomotor Tests	Conduct and analyze oculomotor tests like saccades and fixation.
Week 12	Pediatric Binocular Vision Testing	Perform binocular vision tests on pediatric patients and offer treatment suggestions.
Week 13	Binocular Vision Assessment in Adults	Conduct comprehensive binocular vision assessments for adult patients.
Week 14	Post-Surgical Strabismus Rehabilitation	Practice rehabilitation techniques for patients post-strabismus surgery.
Week 15	Case Studies in Binocular Vision	Present clinical case studies and diagnose conditions based on tests.
Week 16	Final Practical Exam	Complete a comprehensive practical exam covering all binocular vision skills learned.

Textbooks and Reading Material

- **Clinical Orthoptics** by J.R. Tytla
- **Binocular Vision and Eye Movements** by S. A. M. Németh and J. B. Kline
- **Orthoptics: A Review of Basic Principles and Practices** by J. D. Lee
- **Fundamentals of Binocular Vision: A Clinical Perspective** by S. K. Scott and J. M. Anastasopoulos
- **Vision Therapy: Theoretical and Practical Aspects** by R. A. W. Green

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.

5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-409	Credit Hours	2(2+0)
Course Title	Ocular Therapeutics				

Course Introduction

Ocular Therapeutics focuses on the use of pharmaceutical agents in the diagnosis and management of ocular diseases. The course is designed to equip students with the knowledge and skills to understand the pharmacology of ocular drugs, their indications, contraindications, and side effects. Emphasis is placed on both systemic and topical treatment options for common and complex eye conditions, including glaucoma, dry eye disease, infections, and ocular allergies. Students will learn to make informed clinical decisions regarding the selection, dosage, and monitoring of ocular medications.

Learning Outcomes

On the completion of the course, the students will:

- **Understand and apply the pharmacology** of ocular medications for various eye diseases.
- **Recognize common and complex ocular conditions** and determine appropriate pharmacological treatments.
- **Assess and monitor the effects** of ocular therapeutics, including side effects and contraindications.
- **Demonstrate the ability to manage the pharmaceutical aspects** of ocular disease treatment, including patient education on the use of medications.
- **Develop clinical decision-making skills** in prescribing and monitoring ocular therapeutics.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Ocular Therapeutics	Read the introductory section on ocular therapeutics and basic pharmacology.
	Pharmacology of Topical Ocular Drugs	Study the mechanisms of action for topical ophthalmic medications.
Week 2	Pharmacokinetics in Ocular Therapeutics	Research how ocular drugs are absorbed, distributed, metabolized, and excreted.
	Mechanisms of Drug Action in the Eye	Review how ocular drugs interact with eye tissues.
Week 3	Anti-Glaucoma Medications	Study various classes of glaucoma medications, including their side effects and indications.
	Therapeutic Management of Glaucoma	Learn about managing open-angle glaucoma through pharmacological treatments.
Week 4	Ocular Surface Diseases and Dry Eye Therapy	Study medications used to treat dry eye syndrome and ocular surface disorders.
	Antibiotics and Antifungals in Ocular Infections	Research the use of antibiotics and antifungals for managing ocular infections.
Week 5	Antivirals for Ocular Herpes Simplex Virus	Learn about antiviral drugs used for ocular herpes simplex infections.
	Ocular Allergy Medications	Study antihistamines and mast cell stabilizers used in allergic conjunctivitis.
Week 6	Corticosteroids in Ocular Disease Management	Review the use of corticosteroids for treating various ocular diseases.
	Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in Ocular Therapy	Investigate NSAIDs and their role in ocular inflammation management.

Week 7	Ocular Therapeutics for Uveitis	Study pharmacological treatments for managing uveitis.
	Immunosuppressive Drugs in Ocular Therapy	Learn about the role of immunosuppressive agents in ocular disease treatments.
Week 8	Topical and Systemic Pain Management in Ocular Conditions	Review the use of pain management drugs in ocular treatments.
	Ocular Therapeutics in Post-Surgical Care	Study the pharmacological management of ocular conditions post-surgery.
Week 9	Management of Ocular Hypertension	Review medications used to manage ocular hypertension.
	Therapeutic Approaches for Retinal Diseases	Study pharmacological treatments for retinal diseases like macular degeneration.
Week 10	Ocular Therapeutics in Diabetic Retinopathy	Learn about drugs used in managing diabetic retinopathy.
	Pharmacotherapy for Age-Related Macular Degeneration	Study available pharmacological treatments for macular degeneration.
Week 11	Contact Lens-Related Ocular Conditions and Medications	Review therapeutic approaches for contact lens-related ocular complications.
	Ocular Side Effects of Systemic Medications	Study ocular side effects caused by systemic medications.
Week 12	Therapeutics for Ocular Pain and Inflammation	Learn about medications for ocular pain management and inflammation.
	Advanced Drug Delivery Systems in Ophthalmology	Investigate advanced drug delivery systems used in ocular therapeutics.
Week 13	Challenges in Pediatric Ocular Therapy	Study the special considerations when prescribing medications for pediatric ocular conditions.
	Aging and Ocular Drug Therapy	Review considerations when prescribing ocular drugs for older patients.
Week 14	Managing Ocular Toxicity and Side Effects	Learn about managing adverse effects of ocular drugs.
	Legal and Ethical Issues in Ocular Therapeutics	Study the legal and ethical aspects of prescribing and administering ocular medications.
Week 15	Monitoring Treatment Effectiveness in Ocular Disease	Understand how to monitor and assess the effectiveness of ocular therapeutics.
	Clinical Case Studies in Ocular Therapeutics	Review and analyze case studies on ocular therapeutics in clinical settings.
Week 16	Advances in Ocular Drug Development	Research current advancements and future trends in ocular pharmacology.
	Final Review and Exam Preparation	Review all topics covered in the course and prepare for the final exam.

Textbooks and Reading Material

- **"Ocular Therapeutics: A Clinical Guide to Diagnosis and Treatment"** by M. M. Lemp and P. D. Cavanagh
- **"Basic and Clinical Pharmacology of the Eye"** by D. B. T. Foulds
- **"Pharmacology of Ocular Diseases"** by P. D. Cavanagh and L. H. Sheppard
- **"Clinical Ocular Pharmacology"** by A. K. Choroid
- **"Handbook of Ocular Therapeutics and Drug Delivery"** by C. A. D. Sahu

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.
4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-410	Credit Hours	3 (3+0)
Course Title	Systemic Diseases & Neuro Ophthalmology				

Course Introduction

The **Systemic Diseases & Neuro-Ophthalmology** course is designed to provide students with an in-depth understanding of how systemic diseases affect the eyes and the visual system. It will focus on the pathophysiology, diagnosis, and management of various systemic conditions that have ocular manifestations, such as diabetes, hypertension, autoimmune diseases, and infectious diseases. Additionally, the course will delve into neuro-ophthalmology, covering diseases and disorders that affect the optic nerves, visual pathways, and brain regions responsible for vision.

Students will learn about the complex interplay between systemic health and ocular health, equipping them with the knowledge to recognize systemic conditions that present with ocular symptoms, perform diagnostic tests, and apply appropriate treatment or referrals. The course will also cover common and rare neuro-ophthalmic conditions, such as optic neuropathies, papilledema, and visual disturbances due to brain lesions.

Learning Outcomes

On the completion of the course, the students will:

- **Identify systemic diseases** that affect the eyes and the visual system and recognize their clinical manifestations.
- **Understand the pathophysiology** of ocular manifestations in systemic diseases and neuro-ophthalmic conditions.
- **Diagnose common neuro-ophthalmic disorders**, including optic neuropathies, papilledema, and visual disturbances due to neurological issues.
- **Assess and manage patients** with systemic conditions that present with ocular signs and symptoms.
- **Use appropriate diagnostic tools** to evaluate neuro-ophthalmic disorders and systemic diseases affecting the visual system.
- **Refer patients for appropriate systemic or neurological interventions** when required.
- **Apply clinical reasoning** in determining the relationship between systemic diseases and ocular health in a variety of cases.

Course Content (Theory)		Assignments/Readings
Week 1	Introduction to Systemic Diseases and Neuro-Ophthalmology	Read from "Neuro-Ophthalmology: Diagnosis and Management"
	The Relationship Between Systemic Diseases and the Eye	Study the ocular manifestations of systemic diseases.
	Diabetes and Its Ocular Complications	Read about diabetic retinopathy from "Systemic Diseases and the Eye."
Week 2	Hypertension and Its Effects on the Eye	Review hypertension and its ocular manifestations.
	Ocular Manifestations of Autoimmune Diseases	Study the impact of autoimmune diseases on vision.
	Ocular Infections and Systemic Disease	Read about systemic infections that affect the eyes.
Week 3	Infectious and Inflammatory Disorders in the Eye	Investigate systemic infections with ocular signs and symptoms.
	Vascular Diseases and Their Impact on the Eye	Study the ocular effects of cardiovascular diseases.
	Thyroid Disorders and Ocular Manifestations	Review thyroid eye disease and its ocular effects.
Week 4	Ocular Involvement in Renal Disease	Learn about ocular conditions related to kidney diseases.

	Ocular Manifestations of Liver Diseases	Investigate how liver diseases affect the eyes.
	Neurological Diseases and Visual Pathways	Study the role of the nervous system in vision.
Week 5	Neuro-ophthalmic Examination Techniques	Review clinical techniques for examining neuro-ophthalmic conditions.
	Optic Neuritis and Other Optic Neuropathies	Read about optic neuritis and its treatment options.
	Papilledema and Raised Intracranial Pressure	Study the causes and management of papilledema.
Week 6	Stroke and Its Effects on Vision	Investigate how strokes affect vision and visual pathways.
	Visual Disturbances and Brain Lesions	Review the effects of brain lesions on visual perception.
	Visual Field Defects and Their Causes	Learn to diagnose and assess visual field defects.
Week 7	Multiple Sclerosis and Visual System Involvement	Read about the ocular effects of multiple sclerosis.
	Parkinson's Disease and Its Ocular Implications	Study the relationship between Parkinson's and visual symptoms.
	Ocular Trauma and Its Impact on Vision	Investigate trauma-induced neuro-ophthalmic disorders.
Week 8	Brain Tumors and Their Effects on Vision	Study how brain tumors affect the visual system.
	Migraine and Visual Disturbances	Learn about the ocular manifestations of migraines.
	Ocular Motor Dysfunction in Neuro-Ophthalmology	Study the ocular motor problems resulting from neurological conditions.
Week 9	Pediatric Neuro-Ophthalmology	Investigate common pediatric neuro-ophthalmic conditions.
	Aging and Neuro-Ophthalmic Diseases	Study the aging-related changes in the visual system.
	Clinical Case Studies in Systemic Diseases and the Eye	Analyze real-life case studies of systemic diseases affecting the eyes.
Week 10	Ocular Manifestations of Infectious Diseases	Research how infectious diseases impact the visual system.
	Genetic Disorders and Ocular Manifestations	Investigate the impact of genetic disorders on ocular health.
	Ocular Toxicity from Systemic Medications	Learn about the ocular side effects of systemic medications.
Week 11	Neuro-ophthalmic Disorders in Children	Study neuro-ophthalmic disorders in pediatric patients.
	Neuro-Ophthalmic Assessment and Diagnosis	Learn the diagnostic techniques used in neuro-ophthalmology.
	Diagnostic Imaging in Neuro-Ophthalmology	Review imaging techniques in diagnosing neuro-ophthalmic conditions.
Week 12	Ocular Manifestations of Systemic Inflammatory Diseases	Study ocular issues related to systemic inflammatory diseases.

	Neurodegenerative Diseases and Vision	Investigate the effect of neurodegenerative diseases on the visual system.
	Ocular Manifestations of Autoimmune Conditions	Study the link between autoimmune conditions and vision problems.
Week 13	Therapeutic Approaches for Neuro-Ophthalmic Disorders	Learn about treatments for neuro-ophthalmic diseases.
	Pharmacological Management in Neuro-Ophthalmology	Review pharmacological options for treating neuro-ophthalmic conditions.
	Surgical Interventions in Neuro-Ophthalmology	Study surgical treatments for neuro-ophthalmic conditions.
Week 14	Managing Chronic Neuro-ophthalmic Conditions	Learn about managing long-term neuro-ophthalmic conditions.
	Systemic Disease Monitoring in Neuro-Ophthalmology	Investigate how systemic disease monitoring relates to eye care.
	Ocular Complications of Systemic Diseases	Study the treatment options for ocular complications from systemic diseases.
Week 15	Neuro-ophthalmology in Developing Countries	Explore challenges and approaches in neuro-ophthalmology in low-resource settings.
	Advances in Neuro-Ophthalmic Diagnostics	Review new techniques and advancements in neuro-ophthalmic diagnostics.
	Ethical and Legal Issues in Neuro-Ophthalmology	Study the ethical considerations and legal implications in managing neuro-ophthalmic conditions.
Week 16	Multidisciplinary Approach to Systemic Diseases and Ocular Health	Learn the role of multi-specialty collaboration in patient care.
	Review of Key Concepts in Neuro-Ophthalmology	Review and consolidate key topics covered in neuro-ophthalmology.
	Final Exam Preparation and Case Study Review	Final review and preparation for the end-of-course exam.

Textbooks and Reading Material

- **"Neuro-Ophthalmology: Diagnosis and Management"** by Neil R. Miller and Mark W. Greenberg
- **"Systemic Diseases and the Eye"** by D.L. Duane and K. G. Lee
- **"Clinical Neuro-Ophthalmology"** by A. S. Bruce, R. H. Weitzman
- **"Ocular Manifestations of Systemic Diseases"** by Edward J. Holland and Robert S. A. Levine
- **"Neuro-Ophthalmology: A Problem-Oriented Approach"** by R. Joseph Astbury, Michael L. G. V. O'Brien
- **"Clinical Ophthalmology: A Systematic Approach"** by K. N. S. Chawla

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
2. **Collaborative Learning**
   Students will work in pairs or small groups to write essays, analyze readings, and give peer feedback on presentations.
3. **Case Studies**
   Use case studies to explore real-life examples of communication in business, academic, and casual settings.

4. **Role-Playing and Simulations**
   To practice persuasive speaking, public speaking, and informal conversations.
5. **Technology Integration**
   Use educational apps and software like Google Docs for collaborative writing and peer reviews, and Zoom for virtual presentations.

Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-411	Credit Hours	1
Course Title	Scientific Writings				

Course Introduction

This course, **Scientific Writing**, is designed for students in the field of Allied Health Sciences who wish to develop essential skills in writing scientific documents, including research reports, research papers, and thesis dissertations. It provides a comprehensive overview of the key elements of scientific writing, with a focus on the structure and components of research reports, methods for writing research papers, publication processes, ethical considerations in research, and effective presentation techniques.

The course will equip students with the knowledge and skills required to produce high-quality scientific documents and communicate their research findings effectively. Through theoretical lectures and practical assignments, students will learn how to write, revise, and present their research in a clear, concise, and professional manner. This course will also introduce students to the use of digital tools and resources to aid their research, referencing, and publication processes.

By the end of this course, students will be prepared to write and publish research articles, navigate the peer review process, and present their work at scientific conferences.

Learning Outcomes

On the completion of the course, the students will:

- Learn the structure and components of research reports, papers, and theses.
- Develop skills to write clear, concise, and well-organized scientific content.
- Understand the publication process, including peer review and journal selection.
- Explore ethical considerations in research, including informed consent and responsible conduct.
- Gain proficiency in using research tools, reference management software, and presenting research findings.

Course Content		Assignments/Readings
Week 1	Scientific Writing: Research Reports and Thesis	Structure and components of research reports and thesis
Week 2	Scientific Writing: Research Reports and Thesis	Guidelines for effective scientific writing
Week 3	Scientific Writing: Research Reports and Thesis	Writing research objectives, methods, results, and discussion sections
Week 4	Research Paper: Research Articles and Review Articles	Differentiating between research articles and review articles
Week 5	Research Paper: Research Articles and Review Articles	Structure and elements of research articles
Week 6	Research Paper: Research Articles and Review Articles	Writing a research article: introduction, methods, results, discussion
Week 7	Journal Publication, Peer Review, and Citation Styles	Publication process and journal selection
Week 8	Journal Publication, Peer Review, and Citation Styles	Peer review process and responding to reviewer comments
Week 9	Journal Publication, Peer Review, and Citation Styles	Citation styles and referencing techniques
Week 10	Ethical Considerations in Research	Research ethics and responsible conduct
Week 11	Ethical Considerations in Research	Informed consent and protection of human subjects

Week 12	Ethical Considerations in Research	Ethical issues in clinical research
Week 13	Research Poster Presentation	Designing effective research posters
Week 14	Research Poster Presentation	Creating visually appealing content
Week 15	Research Poster Presentation	Presenting research posters confidently
Week 16	Research Tools and Resources	Introduction to statistical software and data analysis tools Utilizing research tools: Google Scholar, ScienceDirect, PubMed Reference management software (e.g., EndNote) and identifying reputable journals

Textbooks and Reading Material

- Pajo, B. (2022). *Introduction to Research Methods: A Hands-on Approach*. Sage Publications.
- Saramäki, J. (2018). *How to Write a Scientific Paper: An Academic Self-Help Guide for PhD Students*. Independently Published.
- Kumar, A., & Ram, M. (2022). *Operations Research: Methods, Techniques, and Advancements*. CRC Press.
- Setchell, J. M. (2019). *Studying Primates: How to Design, Conduct, and Report Primatological Research*. Cambridge University Press.
- Cleland, J., & Durning, S. J. (2022). *Researching Medical Education*. John Wiley & Sons.
- Smith, J. A., & Johnson, R. B. (2020). *Research Skills and Scientific Writing: A Comprehensive Guide*. Academic Press.
- Williams, M. L., & Jones, S. P. (2019). *Mastering Research: A Practical Guide to Effective Scientific Writing*. Springer.

Teaching Learning Strategies

1. **Interactive Lectures**
   Engage students with interactive presentations, discussions, and real-time corrections of writing and speaking errors.
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5. **Technology Integration**
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Assignments: Types and Number with Calendar

1. Quiz-1
2. Quiz-II
3. Presentation
4. Professional Writing Assignments

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

2.	Formative Assessment	25%	Formative assessment includes: 1. Classroom presentations: 10 % 2. Quiz before mid-exam: 5% 3. Quiz before final-exam: 5% 4. Attendance regularity: 5%
3.	Final Assessment	40%	Written Examination at the end of the semester.

Programme	Optometry & Vision Sciences	Course Code	OVS-412	Credit Hours	3 (3+0)
Course Title	Biosafety & Risk Management				

Course Introduction

Biosafety & Risk Management introduces the science of safety in healthcare, focusing on patient safety, risk management, and medical malpractice. The course emphasizes medical equipment safety, quality assurance, and regulatory strategies. Students will learn ISO/IEC standards and regulatory requirements crucial for translating medical device concepts into commercial products.

Learning Outcomes

On the completion of the course, the students will:

- **Assess Patient Safety Risks**: Identify, evaluate, and manage safety risks within healthcare environments, ensuring patient safety.
- **Implement Risk Management Strategies**: Develop and apply effective risk management plans to prevent adverse events and minimize medical malpractice.
- **Ensure Medical Equipment Safety**: Demonstrate knowledge of quality assurance testing and protocols to ensure the safety and reliability of medical devices.
- **Navigate Regulatory Requirements**: Understand and apply key ISO/IEC standards and regulatory frameworks governing medical device development and commercialization.
- **Contribute to Quality Management**: Contribute to the development and implementation of quality management systems in healthcare settings.
- **Promote Safety through Teamwork**: Collaborate effectively within multidisciplinary teams to improve safety outcomes and address healthcare risks.
- **Translate Concepts to Commercial Products**: Gain the skills needed to bring a medical device idea to market, ensuring it meets regulatory and safety standards.

	Course Content (Theory)	Assignments/Readings
Week 1	**Introduction to the Science of Safety**: Basic principles of safety in biomedical instrumentation and healthcare.	Read: Importance of Safety in Healthcare.
	Errors and Adverse Events in Healthcare: Types of errors, their causes, and consequences in clinical settings.	Assignment: Case study on a healthcare-related adverse event.
	Models of Safety and Change: Different models for improving safety, including systems theory and the culture of safety.	Read: Models of Safety in Healthcare.
Week 2	**Culture of Safety**: Establishing a culture of safety within healthcare institutions.	Assignment: Research paper on creating a culture of safety in a healthcare facility.
	Detection and Reporting of Injuries and Errors: Methods for identifying and reporting clinical errors and injuries.	Assignment: Report on injury detection and reporting methods in hospitals.
	Investigative Methods: Techniques and methods for investigating adverse events and medical errors.	Read: Investigative Approaches to Safety.
Week 3	**Disclosure of Adverse Events**: Legal and ethical considerations in disclosing errors to patients.	Assignment: Discuss ethical guidelines for reporting adverse events.
	Improvement of Clinical Systems: Strategies for improving safety within clinical systems and reducing risk.	Assignment: Develop a proposal for improving a clinical system's safety measures.
	Policy Interventions: Role of policy in improving patient safety and reducing errors.	Read: The Role of Policy in Healthcare Safety.

Week 4	**Medical Device Safety and Risk Management**: Principles of medical device safety, risk assessment, and management.	Assignment: Research paper on risk management strategies for medical devices.
	Effectiveness/Performance of Medical Devices: Assessing the effectiveness and performance of medical devices.	Assignment: Case study on the performance evaluation of a medical device.
	Phases in the Life Span of a Medical Device: Stages from development to decommissioning.	Read: Medical Device Life Cycle.
Week 5	**Participants in Ensuring Medical Device Safety**: Roles of manufacturers, regulators, clinicians, and patients in ensuring safety.	Assignment: Identify the key stakeholders in medical device safety.
	The Role of Each Participant/Stakeholder: Detailed roles and responsibilities of each participant in the safety process.	Read: Stakeholders in Medical Device Safety.
	Shared Responsibility for Device Safety and Performance: Collaborative efforts needed to ensure safety and performance.	Assignment: Discuss how shared responsibility improves medical device safety.
Week 6	**Regulatory Affairs Overview**: Introduction to regulatory frameworks for medical devices, including FDA and international regulations.	Read: Regulatory Affairs in Medical Device Development.
	Medical Device Classification (US - FDA): Understanding FDA classifications and regulations for medical devices.	Assignment: Research the FDA classification for a specific medical device.
	Medical Device Classification (Canada - MDELCE): Overview of Canada's MDELCE classification and approval processes.	Assignment: Compare FDA and Canadian device classification systems.
Week 7	**Medical Device Classification (EU - MDR)**: Understanding the EU MDR (Medical Device Regulation) and its impact on device approval.	Read: EU Regulations on Medical Devices.
	Marking Requirements for Medical Devices: Overview of labeling and CE marking requirements in the EU.	Assignment: Discuss marking and labeling requirements for devices.
	Quality Assurance Overview: Introduction to quality assurance principles and consensus standards.	Read: Quality Assurance in Biomedical Devices.
Week 8	**Overview of Recognized Consensus Standards**: Focus on ISO, IEC, and other quality standards in medical devices.	Assignment: Identify the most important consensus standards for a specific device.
	Quality Management Systems (QMS): Basics of QMS and their role in ensuring device quality throughout its lifecycle.	Assignment: Prepare a report on the importance of QMS in medical device manufacturing.
	FDA Quality System Regulations: Detailed discussion on FDA's QSR, including design controls, production, and testing.	Read: FDA Regulations and Quality Systems.
Week 9	**FDA Labeling Requirements**: Overview of FDA's labeling regulations and their role in device safety.	Assignment: Analyze the labeling requirements for a medical device.
	Process Validation in Medical Devices: Validation processes to ensure device performance and safety before commercialization.	Read: Process Validation in Device Manufacturing.
	Corrective and Preventive Actions (CAPA): Understanding CAPA systems and their role in addressing non-conformities.	Assignment: Case study on the application of CAPA in medical device companies.
Week 10	**Design Control in Medical Devices**: Introduction to design control processes to ensure safety and compliance.	Read: Design Control in Device Development.

	Risk Management and Mitigation Strategies: Exploring strategies for mitigating risk throughout a device's lifecycle.	Assignment: Create a risk management plan for a medical device.
	Clinical Evaluation and Post-market Surveillance: Methods for assessing the clinical performance and monitoring devices post-market.	Read: Clinical Evaluation and Post-market Surveillance.
Week 11	**Clinical Trials and FDA Approval Process**: Overview of clinical trials and the FDA approval process for medical devices.	Assignment: Analyze the clinical trial requirements for FDA approval.
	Device Recalls and Handling Safety Issues: Procedures for handling device recalls and ensuring patient safety.	Assignment: Report on a recent device recall and its impact on public health.
	International Regulations and Harmonization: Exploring international regulations and efforts to harmonize medical device standards globally.	Read: International Medical Device Regulations.
Week 12	**Quality Systems and Compliance Audits**: The role of compliance audits in ensuring ongoing safety and quality of medical devices.	Assignment: Discuss the role of audits in maintaining device quality.
	Medical Device Risk Assessment and Mitigation: Approaches to evaluating and mitigating risks during the device lifecycle.	Read: Risk Assessment in Medical Devices.
	Regulatory Submissions and Documentation: How to prepare regulatory submissions and meet documentation requirements for device approval.	Assignment: Prepare a mock regulatory submission.
Week 13	**Medical Device Innovation and Regulatory Considerations**: Understanding how innovation affects regulatory approvals.	Read: Regulatory Considerations in Device Innovation.
	Market Entry Strategies for Medical Devices: Strategies for entering the market with a new medical device, considering regulatory and quality requirements.	Assignment: Create a market entry strategy for a new medical device.
	Ethical Considerations in Device Safety and Regulation: Addressing ethical challenges in the safety, regulation, and commercialization of medical devices.	Read: Ethics in Medical Device Safety and Regulation.
Week 14	**Post-market Surveillance and Device Safety**: Methods of ensuring device safety and performance after market introduction.	Assignment: Research on post-market surveillance systems for medical devices.
	Medical Device Safety in Emerging Markets: Challenges and strategies for ensuring device safety in developing regions.	Read: Global Safety Challenges for Medical Devices.
	Final Review of Medical Device Safety and Regulations: Recap of key regulatory and safety topics in biomedical instrumentation.	Review: Study for final exam on device safety and regulation.
Week 15	**Case Studies in Medical Device Failures**: Review of case studies involving medical device failures and their impact.	Assignment: Analyze a case study of a medical device failure.
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Week 16	**Final Exam Preparation**: Comprehensive review and preparation for the final exam.	Review: Comprehensive review session.
	Final Exam Preparation: Comprehensive review and preparation for the final exam.	Review: Comprehensive review session.

	Final Exam: Written examination on all topics covered in the course.	Final Exam: Assessment of theoretical knowledge on device safety and regulations.

Textbooks and Reading Material

- Rene, E. R., Shu, L., &Jegatheesan, V. (2019). *Environmentally Friendly (Bio)Technologies for the Removal of Emerging Organic and Inorganic Pollutants from Water.* IWA Publishing.
- Jain, A., Agarwal, J., & Venkatesh, V. (2018). *Microbiology Practical Manual* (E-book). Elsevier Health Sciences.
- Stawicki, S. P., Firstenberg, M. S., Galwankar, S. C., Izurieta, R., &Papadimos, T. (2021). *Contemporary Developments and Perspectives in International Health Security: Volume 1.*BoD – Books on Demand.
- Wang, B. (2022). *Medical Equipment Maintenance: Management and Oversight.* Springer Nature.
- Salerno, R. M., &Gaudioso, J. M. (2021). *Laboratory Bio Risk Management: Biosafety and Biosecurity.* CRC Press.
- Biram, T. (2019). *Biotech & Bioethics.* Issues Series.
- Great Britain: Department of Health: Estates and Facilities Division. (2018). *Safe Management of Healthcare Waste: Environment and Sustainability.* The Stationery Office.

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Checklist for a New Academic Program

Parameters	**YES/NO**	
1. Department Mission and Introduction	YES ☐	NO ☐
2. Program Introduction	YES ☐	NO ☐
3. Program Alignment with University Mission	YES ☐	NO ☐
4. Program Objectives	YES ☐	NO ☐
5. Market Need/ Rationale	YES ☐	NO ☐
6. Admission Eligibility Criteria	YES ☐	NO ☐
7. Duration of the Program	YES ☐	NO ☐
8. Assessment Criteria	YES ☐	NO ☐
9. Courses Categorization as per HEC Recommendation	YES ☐	NO ☐
10. Curriculum Difference	YES ☐	NO ☐
11. Study Scheme / Semester-wise Workload	YES ☐	NO ☐
12. Award of Degree	YES ☐	NO ☐
13. Faculty Strength	YES ☐	NO ☐
14. NOC from Professional Councils (if applicable)	YES ☐	NO ☐

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Program Coordinator **Chairperson**