

STUDY & EVALUATION SCHEMES
OF
BACHELOR OF OPTOMETRY (BO)
(BO - IV SEMESTER)

[Applicable w.e.f. Academic Session 2020-21]



INTEGRAL UNIVERSITY, LUCKNOW
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Syllabus approved by Board of Study, Faculty Board, Academic Council, Executive Council of the Integral University, Lucknow

INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH
DEPARTMENT OF PARAMEDICAL & HEALTH SCIENCES

STUDY & EVALUATION SCHEME
BACHELOR OF OPTOMETRY (BO)
(w.e.f. July 2020)

II- Year

IV-Semester

S. No	Code	Name of the Subject	Periods			Credits	Evaluation Scheme				Subject Total
			L	T	P		C	Sessional		Exam	
						CT		TA	Total	ESE	
1.	BO209	Visual Optics-II	3	1	0	4	40	20	60	40	100
2.	BO210	Ocular Diseases-II	3	1	0	4	40	20	60	40	100
3.	BO211	Clinical Examination of Visual System	3	1	0	4	40	20	60	40	100
4.	BO212	Low Vision Aid & Optometry Investigation	3	1	0	4	40	20	60	40	100
5.	BO213	General & Ocular Pharmacology	2	1	0	3	40	20	60	40	100
6.	BO214	Visual Optics-II - Lab	0	0	2	1	40	20	60	40	100
7.	BO215	Clinical Examination of Visual System - Lab	0	0	2	1	40	20	60	40	100
8.	BO216	Low Vision Aid & Optometry Investigation - Lab	0	0	2	1	40	20	60	40	100
9.	BO217	Hospital Posting-Lab	0	0	6	3	40	20	60	40	100
		Total	14	05	10	25	360	180	540	360	900

L: Lecture **T:** Tutorials **P:** Practical **C:** Credit **CT:** Class Test

TA: Teacher Assessment **ESE:** End Semester Examination

Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)

SUBJECT NAME: VISUAL OPTICS- II
SUBJECT CODE: BO209
(W.e.f. July 2020)

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

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

UNIT I-

(8 hours)

1. Accommodation & Presbyopia
2. Far and near point of accommodation
3. Range and amplitude of accommodation
4. Mechanism of accommodation, Variation of accommodation with age
5. Anomalies of accommodation, Presbyopia

UNIT II- OBJECTIVE REFRACTION

(8 hours)

1. Streak Retinoscopy- Principle, Procedure, Difficulties and interpretation of findings
2. Transposition and spherical equivalent
3. Dynamic retinoscopy various methods
4. Radical retinoscopy and near retinoscopy
5. Cycloplegic refraction, Hypermetropia and accommodation

UNIT III- SUBJECTIVE REFRACTION:

(8 hours)

1. Principle and fogging
2. Fixed astigmatic dial(Clock dial), Combination of fixed and rotator dial(Fan and block test), J.C.C
3. Duochrome test- Binocular balancing- alternate occlusion, prism dissociation, dissociate
4. Duochrome balance, Borish dissociated fogging
5. Binocular refraction-Variation of accommodation, Mechanism of accommodation, Variation of accommodation with age

UNIT IV- EFFECTIVE POWER & MAGNIFICATION:

(8 hours)

1. Ocular refraction vs. Spectacle refraction
2. Spectacle magnification vs. Relative spectacle magnification
3. Axial vs. Refractive ametropia, Knapp's law
4. Ocular accommodation vs. Spectacle accommodation
5. Retinal image blur-Depth of focus and depth of field

UNIT V-MEASUREMENTS OF OPTICAL CONSTANTS OF THE EYE:

(8 hours)

1. Keratometry, Curvature of the lens and ophthalmometry
2. Spectacle magnification vs. Relative spectacle magnification
3. Axial and axis of the eye
4. Basic aspects of vision- Visual acuity, Light and dark adaptation Colour vision, Spatial and temporal resolution
5. Science of measuring visual performance and application to clinical optometry

RECOMMENDED BOOKS:

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

SUBJECT NAME: OCULAR DISEASES-II
SUBJECT CODE: BO210
(W.e.f. July 2020)

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OBJECTIVES:

At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: Etiology, Epidemiology, Symptoms, and Signs, Course sequelae of ocular disease, Diagnostic approach and Management of the ocular diseases.

UNIT I- RETINA AND VITREOUS: (8 hours)

1. Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery)
2. Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic)
3. Retinal Vasculitis (Eales's), Retinal Artery Occlusion (Central retinal Artery occlusion)
4. Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion)
5. Retinal degenerations : Pigmentosa, Lattice degenerations, Retinoblastoma, Diabetic retinopathy
6. Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration., Retinal Detachment: Rhegmatogenous, Tractional, Exudative)

UNIT II- OCULAR INJURIES: (8 hours)

1. Terminology : Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury)
2. Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)
3. Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational)
4. Clinical approach towards ocular injury patients

UNIT III- LENS: (8 hours)

1. Classification of cataract, Congenital and Developmental cataract
2. Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic)
3. Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar.
4. Management of cataract (Non-surgical and surgical measures; preoperative evaluation, Types of surgeries,)
5. Complications of cataract surgery
6. Displacement of lens: Subluxation, Displacement, Lens coloboma, Lenticonus, Microspherophakia.

UNIT IV- VISUAL PATHWAY: (8 hours)

1. Anatomy of visual pathway, Lesions of the visual pathway
2. Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus Gunn pupil, Argyll Robertson pupil, Adie's tonic pupil)
3. Optic neuritis, Anterior Ischemic optic neuropathy, Papilloedema, optic atrophy
4. Cortical blindness, Malingering
5. Nystagmus, Clinical examination

UNIT V- GLAUCOMA:**(8 hours)**

1. Definitions and classification of glaucoma, Pathogenesis of glaucomatous ocular damage
2. Congenital glaucoma's, Primary open angle glaucoma
3. Ocular hypertension, Normal Tension Glaucoma
4. Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure)
5. Secondary Glaucoma's, Management : common medications, laser intervention and surgical techniques

RECOMMENDED BOOKS:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international, Ltd. Publishers, New Delhi, 2007.
2. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990.
3. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007.

SUBJECT NAME: CLINICAL EXAMINATION OF VISUAL SYSTEM
SUBJECT CODE: BO211
(W.e.f. July 2020)

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

UNIT I- (8 hours)

1. History taking
2. Visual acuity estimation
3. Extraocular motility, Cover test, Alternating cover test
4. Hirschberg test, Modified Krimsky

UNIT II- (8 hours)

1. Pupils Examination
2. Maddox Rod
3. Van Herrick
4. External examination of the eye, Lid Eversion

UNIT III- (8 hours)

1. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),
2. Color Vision
3. Stereopsis
4. Confrontation test

UNIT IV- (8 hours)

1. Photostress test
2. Slit lamp biomicroscopy
3. Ophthalmoscopy
4. Tonometry

UNIT V- (8 hours)

1. ROPLAS
2. Amsler test
3. Contrast sensitivity function test
4. Saccades and pursuit test

RECOMMENDED BOOKS:

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

SUBJECT NAME: LOW VISION AID & OPTOMETRY INVESTIGATION
SUBJECT CODE: BO212
(W.e.f. July 2020)

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

A. LOW VISION AIDS

UNIT I- **(8 hours)**

1. Definitions & classification of Low vision, Epidemiology of low vision
2. Model of low vision service
3. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psychosocial impact of low vision
4. Types of low vision aids – optical aids, non-optical aids & electronic devices , Optics of low vision aids

UNIT II- **(8 hours)**

1. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training
2. Paediatric Low Vision care, Low vision aids – dispensing & prescribing aspects
3. Visual rehabilitation & counselling
4. Legal aspects of Low vision in India, Case Analysis.

B. OPTOMETRY INVESTIGATION

UNIT III- **(8 hours)**

1. Visual Acuity Testing & Theory, Colour Vision Testing & Theory
2. Electro Retino Graphy, E.R.G., Electro Oculo Graphy, E.O.G.
3. Fluorescein Angiography F.A., Ultrasono Graphy U.S.G.
4. Visual Evoked Response / Potential V.E.R. or V.E.P.
5. Tonometer, Tonometry & Tonography, Visual Field Charting & Perimetry

UNIT IV- **(8 hours)**

1. Adaptation & Adaptometry, Berman's Locator , Cryo Technique, Diathermy
2. Photo-coagulation, Method's of examination (Focal illumination)
3. Slit lamp and attachments, Goinoscopy
4. Ocular Photography (Ant.Seg.), Contact & Trans-illumination

UNIT V- **(8 hours)**

1. pH Testing & Schirmer's Test
2. Fluorescein Staining & Techniques, Syringing & Lacrimal Function Test
3. Ophthalmoscopy, Retinoscopy
4. Auto-Refractometry, Keratometry
5. Ophthalmic Lens Measuring Instruments

RECOMMENDED BOOKS:

1. T Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, USA, 2007.
2. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007.
3. D B. Elliott: Clinical Procedures in Primary Eye Care, 3rd edition, Butterworth-Heinemann, 2007.
4. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007.
5. J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins, 1991.

SUBJECT NAME: GENERAL & OCULAR PHARMACOLOGY
SUBJECT CODE: BO213
(W.e.f. July 2020)

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

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

UNIT I- GENERAL PHARMACOLOGY: (8 hours)

1. Mechanisms of drug action
2. Dose-response relationships
3. Tachyphylaxis and idiosyncrasy
4. Pharmacokinetics of drug absorption, distribution, Biotransformation, excretion and toxicity.
5. Factors influencing drug metabolism of drug action.

UNIT II- ACTION OF SPECIFIC AGENTS: (8 hours)

1. Depressants, Anti-coagulants
2. C.N.S.Stimulants and antidepressants
3. Diuretics and hypertensive agents
4. Cardiovascular drugs, Histamines
5. Serotonin, Prostaglandins

UNIT III- PRINCIPLES OF OCULAR PHARMACOLOGY: (8 hours)

1. General principles of ocular pharmacology
2. Drug actions and effectiveness, Drug safety
3. Factors influencing the objectively demonstrated response
4. Ocular penetration.
5. Routes of ocular penetration

UNIT IV- OPTOMETRIC DIAGNOSTIC DRUGS: (8 hours)

- a. Optometric use of pharmaceuticals
 1. Classification of drug use
 2. Topical ophthalmic drugs
 3. References and drug indices
 4. Hazards of ophthalmic drugs
 5. Surface active drugs
 6. topical anesthetics
- b. Principles and classification of autonomic drugs
 1. Sympathomimetics
 2. Sympatholytics
 3. Parasympathomimetics
 4. Parasympatholytics
 5. Diagnostic use of autonomic drugs

UNIT V- OPHTHALMOLOGICAL DRUGS USE:

(8 hours)

- a. Anti-glaucoma drugs
 - 1. Drugs for ocular hypertension
 - 2. Drugs that enhance aqueous outflow
 - 3. Inhibitors of aqueous secretion
- b. Sulfonamides
- c. Antibiotics
- d. Corticosteroids
- e. Anesthetics
- f. Proteolytic enzymes

RECOMMENDED BOOKS:

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

SUBJECT NAME: VISUAL OPTICS- II LAB
SUBJECT CODE: BO214
(W.e.f. July 2020)

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1. Radical retinoscopy and near retinoscopy
2. Streak Retinoscopy- Procedure, Difficulties and interpretation of findings
3. Dynamic retinoscopy various methods
4. Cycloplegic refraction, Hypermetropia and accommodation
5. Binocular refraction-Variou techniques
6. Ocular refraction vs. Spectacle refraction
7. Spectacle magnification vs. Relative spectacle magnification

RECOMMENDED BOOKS:

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

SUBJECT NAME: CLINICAL EXAMINATION OF VISUAL SYSTEM - LAB
SUBJECT CODE: BO215
(W.e.f. July 2020)

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1. Visual acuity estimation
2. Extra ocular motility,
3. Cover test, Alternating cover test
4. Pupils Examination
5. External examination of the eye, Lid Eversion
6. Color Vision
7. Stereopsis
8. Photostress test
9. Slit lamp biomicroscopy
10. Ophthalmoscopy
11. Tonometry

RECOMMENDED BOOKS:

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

SUBJECTS NAME: LOW VISION AID & OPTOMETRY INVESTIGATION- LAB
SUBJECT CODE: BO216
(W.e.f. July 2020)

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1. Attending in low vision care clinic and history taking.
2. Determining the type of telescope and its magnification (Direct comparison method & calculated method)
3. Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
4. Inducing visual impairment and prescribing magnification.
5. Determining reading speed with different types of low vision aids with same magnification.
6. Determining reading speed with a low vision aid of different magnifications.

RECOMMENDED BOOKS:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007
2. D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
3. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, Butterworth- Heinemann, 2007

SUBJECTS NAME: HOSPITAL POSTING- LAB
SUBJECT CODE: BO217
(W.e.f. July 2020)

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

History taking ➤ General ➤ Specific ➤ Conditions	30 cases	Can practice on the following complaints : Blurred Vision, Headache, Pain, redness, Watering, Flashes, Floaters, Blacks pots
Lensometry	100 cases	Simple Sphere, Simple cylinder, Spherocylinder (90, 180, Oblique degrees),Bifocals, PAL
Visual Acuity Pinhole acuity	100 cases	Simulation, especially to show and ask the students to interpret the findings.
Extra ocular Motility	10 cases	
Cover test	10 cases	Video output Simulation of various conditions
Alternate Cover test	10 cases	Video output Simulation of various conditions
Hirschberg test	10 cases	Video output Simulation of various conditions
Modified Krimsky test	3 cases	Video output Simulation of various conditions
Push up test (Amplitude of Accommodation)	10 cases (1 case in presbyopic age)	
Push up test (Near point of Convergence)	10 cases	
Stereopsis test	10 cases	
Tear Break up time	10 cases	
Amsler's Grid test	10 cases (simulate)	Simulation of various conditions
Photostress test	10 cases(Normal)	
Color vision test	10 cases	
Schirmer's test	10 cases	
Confrontation test	10 cases	
Torch light Examination	50 cases	
Slit lamp examination	10 cases	
Digital tonometry	10 cases	