



**Technological Educational Institution
(T.E.I.) of Western Greece**

SCHOOL OF HEALTH AND CARING PROFESSIONS

DEPARTMENT OF OPTICS AND OPTOMETRY

Syllabus

Academic year 2010-2011

Aigio, 2011

Syllabus 2010-2011**Semester A**

Module		Category	Code	T	L	Total	W.L.	E.C.
A1	Anatomy I	GBM	0	3	2	5	143	5.5
A2	Introduction to Informatics	GBM	0	2	2	4	105	4
A3	First Aid	GBM	0	2	0	2	75	3
A4	Physics I (Mechanics , Electromagnetism)	GBM	0	4	2	6	180	7
A5	Introduction to Chemistry	GBM	0	3	0	3	113	4.5
A6	Mathematics	GBM	0	4	0	4	150	6
TOTAL				18	6	24	766	30

Semester B

Module		Category	Code	T	L	Total	W.L.	E.C.
B1	Anatomy II	SBM	0	3	2	5	143	5.5
B2	The Science of Vision and Optometry	SBM	0	2	2	4	105	4
B3	Design & Face Aesthetics	GBM	0	2	0	2	75	3
B4	Physiology	GBM	0	4	0	4	150	6
B5	Physics II (Optics)	GBM	0	4	2	6	180	7
B6	Science and Processing of Crystals	SBM	0	3	0	3	113	4.5
TOTAL				18	6	24	765	30

Semester C

Module		Category	Code	T	L	Total	W.L.	E.C.
C1	Neuro-ophthalmology Neurophysiology	SBM	0	3	0	3	113	4.5
C2	Introduction to Optometry	SM	0	2	2	4	105	4
C3	Technology of Ophthalmic Lenses I	SM	0	4	4	8	210	8.5
C4	Applied Optics	SBM	0	4	2	6	180	7
C5	Ocular Pathology	SBM	0	4	0	4	150	6
TOTAL				17	8	25	758	30

Semester D

Module		Category	Code	T	L	Total	W.L.	E.C.
D1	Optical Materials	SBM	0	4	0	4	150	6
D2	Technology of Ophthalmic Lenses II	SM	0	4	4	8	210	8
D3	Microbiology - Immunology	GBM	0	3	0	3	113	4
D4	Foreign Language - Terminology	SBM	0	3	0	3	113	4
D5	Occupational Optics, Visual Ergonomics & Lighting	GBM	0	3	0	3	113	4
D6	Optical Instruments Technology	SBM	0	2	2	4	105	4
TOTAL				19	6	25	803	30

Semester E

Module		Category	Code	T	L	Total	W.L.	E.C.
E1	Ocular Pharmacology	SBM	0	3	0	3	113	4.5
E2	Clinical Optometry I	SM	0	4	2	6	180	7
E3	Machine Vision	SBM	OM	2	0	2	75	3
E4	Optometric Informatics	GBM	0	2	2	4	105	4
E5	Optics & Optometry Deontology	SBM	0	2	0	2	75	3
E6	Contact Lenses I	SM	0	4	4	8	210	8.5
E7	Health and Safety	SBM	OM	2	0	2	75	3
TOTAL				17	8	25	758	30

Semester F

Module		Category	Code	T	L	Total	W.L.	E.C.
F1	Clinical Refraction	SM	0	3	2	5	143	6
F2	Paediatric Optometry- Elderly Optometry	SM	0	3	2	5	143	6
F3	Clinical Optometry II	SM	0	4	2	6	180	7
F4	Health Psychology	SBM	OM	2	0	2	75	3
F5	Costing & Pricing - Marketing	SBM	OM	2	0	2	75	3
F6	Contact Lenses II & Clinical Practice	SM	0	4	4	8	210	8
TOTAL				16	10	26	750	30

Semester G

	Module	Category	Code	T	L	Total	W.L.	E.C.
G1	Methodology of Research in Optics & Optometry	SBM	OM	3	0	3	113	4.5
G2	Orthoptics & Binocular Vision	SM	O	4	2	6	180	7
G3	Laser Technology	SBM	OM	3	0	3	113	4.5
G4	Clinical Applications of Refraction & Optometry	SM	O	3	4	7	173	7
G5	Contemporary Optical Applications	SM	O	3	0	3	113	4.5
G6	Low Vision Aids	SM	O	4	2	6	180	7
	TOTAL			17	8	25	758	30

Semester H

	Module	Category	Code	T	L	Total	W.L.	E.C.
1	Dissertation Thesis						450	20
2	Practical Training/Placement				0	0	300	10
	TOTAL						750	30

Symbolism	Interpretation
T	Theory
L	Laboratory
EC	Educational Credits
WL	Workload
GBM	General Background Modules
SBM	Special Background Modules
SM	Specialization Modules
O	Obligatory Modules
OM	Optional Modules

2. MODULES

SEMESTER A

A1	Anatomy I: Theory 3 h, Laboratory 2 h	GBM
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Human body systems. Musculoskeletal, cardiovascular, urinary, reproductive, gastrointestinal, respiratory, endocrine system and skin. Sensory System. Eye.

A2	Health Informatics: Theory 2 h, Laboratory 2 h	GBM
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Introduction to computers, basics on computer use, computer architecture and function, Windows XP operating system, local networks, Internet, e-mail, word processing, spreadsheets, presentations, databases. Health implications of Computer use.

A3	First Aid: Theory 2 h	GBM
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First Aid: Cardiopulmonary resuscitation, Injury, choking, foreign body aspiration, allergic reaction, food poisoning, bleeding, ocular trauma.

A4	Physics I: Theory 4 h, Laboratory 2h	GBM
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Newton's laws. Work, Energy, Power. Conservation Principles (Energy, Linear and Angular Momentum). Harmonic and Damped Oscillation. Static electricity. Dynamic electricity. Direct Electric Current.

A5	Introduction to Chemistry: Theory 3 h	GBM
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Structure of the atom. Periodic Table and periodic properties, structure, regularities. Atomic orbitals. Molecular orbitals. Chemical bonds, Van der Waals, hydrogen bond. Distinction of matter and dispersion systems. Chemical kinetics: types of velocity, reaction order, equations, activation energy, catalysis, catalysts. Organic compounds: classification and nomenclature. The main members of the homologous series. Organic solvents: alcohols, ethers, ketones, benzene

A6	Mathematics: Theory 4 h	GBM
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Vector Calculus, Determinants and matrices, Complex Numbers, Differential and integral Calculus, Elements of Analytical Geometry. Integer Numbers Z, operations and powers, real Numbers R, operations and powers.

SEMESTER B

B1	Anatomy II: Theory 3 h, Laboratory 2h	SBM
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Aim of this module is the anatomy of the specific and necessary for vision parts of the ocular system. Deep knowledge of the anatomy and function of the eye and the visual path. Study of the eye morphology. Tear formation, lacrimal system (tear formation and secretion), function of the optical area of the brain. Clinical relevance of the above anatomical features.

B2	The Science of Vision and Optometry: Theory 2h, Laboratory 2 h	SBM
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Standards of space perception with vision. Velocity perception through vision. Theory of detecting objects and shapes (volume, size). Theories of color vision, color vision deficiencies. Optical possibilities. Binocular vision. The development of vision. Recent advances in visual science. Reasons for refractive errors - hereditary factors. Environmental factors. Ametropia and its changes with age. The history and development of Optometry as a health care profession Area/scope of optometric practice, optical measurements. Introduction to concepts such as light and vision, vision of shapes, shape perception, motion perception, color vision, optical psychophysical measurements, eye movements, binocular vision.

B3	Design & Face Aesthetics: Theory 2 h	GBM
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Understanding basics in design principles. Basic facial aesthetics. Methods of selecting the optically and aesthetically appropriate frames for each client: color, material, shape, fashion

trends. Troubleshooting. Training in aesthetic and scientific choices for customers. Psychology and understanding of customer choices.

B4	Physiology: Theory 4 h	GBM
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Cell function. Blood. Respiratory system. Cardiovascular system. Kidneys – Urinary tract system. Gastrointestinal system. Temperature regulation. Neural system. Endocrine system. Physiology of the eye.

B5	Physics II (Optics): Theory 4 h , Laboratory 2 h	GBM
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Geometrical optics (reflection, refraction, mirrors). Wave optics (interference, diffraction, polarization). Electromagnetic waves. The nature of light. Light analysis. Light spectrum. Light through a (thin, thick) lens.

B6	Science and Processing of Crystals: Theory 3 h	SBM
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Elements of geometric and wave optics. Induced optical and structural changes - Applications. Vibration properties and vibrating characterization of glasses (Raman and IR spectroscopy). Production and process of glasses (radiation, heating). Production and process of non-crystalline materials and glasses. Mineral ions in glass matrices –ionized and hyper-ionized conductance. Solid glass electrolytes. Process of semi-conductive glasses with heating and radiation. Applications.

SEMESTER C

C1	Neuro-ophthalmology –Neurophysiology: Theory 3 h	SBM
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Neurophysiology and anatomy of the nervous system. Sensory system. Movement. General symptoms of cerebral nerves anomalies. Brain and brain vascular diseases. Peripheral nerves.

Muscle pathology. Myasthenia. Congenital diseases. Cerebral palsy. Multiple sclerosis. Degenerative conditions of the nervous system. Laboratory tests in neurology.

C2	Introduction to Optometry: theory 2 h, Laboratory 2 h	SM
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The history and development of Optometry as a health care profession. Area/scope of optometric practice, optical measurements. Light and vision, vision of shapes, motion perception, color vision, optical psychophysical measurements, eye movements, binocular vision.

C3	Technology of Ophthalmic Lenses I: Theory 4 h, Laboratory 4 h	SM
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Lenses – morphology, properties, transformations and measurement of their power. Schematic eye and ametropia. Eyeglass frames and their measurements. Cut and grind of thin lenses. Prescription eyeglasses. Toric lenses and their transformations. Safety glasses. Prisms – strabismus and its correction. Organic lenses – prescriptions. Eyeglass frames repair. Decentration and prismatic lenses. Accommodation, loss of accommodation.

C4	Applied Optics: Theory 4 h, Laboratory 2 h	SBM
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Optics of ophthalmic lenses. Ophthalmic lens materials. Power of lenses/ of prismatic lenses. Dyes of lenses. Lens coatings. Types of lenses: multifocal lenses, progressive lenses, additions. Special lens designs. Diffractive lenses. Isoeikonic lenses. Light through a lens. Optical design. Aberrations of ophthalmic lenses. Dispersion of lenses. Principles of optical instrumentation.

C5	Ocular Pathology: Theory 4 h	SBM
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Cellular and tissue pathogenesis of ocular diseases. Heredity/ genetics, impact of the environment. An introduction to: inflammation, neoplasia and circulatory disorders.

Pathogenesis and treatment of diseases common in Greece and Europe. Focus on the current biomedical research

SEMESTER D

D1	Optical Materials: Theory 4 h	SBM
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Light transmission, reflection, absorption, double reflection, optical properties of conductors, Drude model. Optical properties of insulators, Lorentz model. Refractive index, dispersion. Dispersion of optical glasses. Optical properties of semiconductors. Optical properties of molecular materials. Electronic vibrational transitions. Frank-Condon principle. Resonance fluorescence. Nonlinear optical processes. The harmonic oscillator model. nonlinear susceptibility. Second and third order nonlinear optical effects. Phase resonance. Nonlinear optical materials .

D2	Technology of Ophthalmic Lenses II: Theory 4 h, Laboratory 4 h	SM
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Bifocal, trifocal and multifocal lenses. Lenses with high power, limited optical zone and high index of refraction. Nylor and Griff prescriptions. Metallic eyeglass frames. Ophthalmic lenses instrumentation. Spherical and cylindrical lens manufacturing. Manufacturing of eccentric lenses, special prescription lenses, dyes of organic lenses, aspheric lenses.

D3	Microbiology – Immunology: Theory 3 h	GBM
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Introduction to the role and nature of bacteria, viruses, fungi and parasites – their role in provoking human diseases. Body defence systems, immune system – autoimmunity, allergies. Antimicrobial treatment. Sterilization, disinfection.

D4	Foreign Language & Terminology: Theory 3 h	SBM
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Conversion of specialty texts into English and vice versa for the proper use of the relevant bibliography to cover undergraduate and postgraduate needs. Skills training with emphasis on oral communication. Use of authentic material and activities related to the specialized field of knowledge of students and their workplace. Teaching English for specific purposes related to the subject of Optics - Optometrist.

D5	Occupational Optics , Visual Ergonomics & Lighting: Theory 3 h	GBM
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Introduction to lighting. Luminous flux and luminous intensity. Light intensity. Brilliance and light emission. Photometers. Lamps and lighting fixtures. Light bulbs. Natural light. Daylight and sunlight. Lighting and buildings. Lighting requirements. IES Code. Lighting requirements in special buildings e.g. schools, offices, factories, museums, etc.

Lighting and photography, energy saving with modern lighting systems.

Optimization and Idealization of Vision - Requirements of Occupations - Everyday Occupations.

Assessment of visual behavior - light contrast sensitivity - optical response times and eye movements.

D6	Optical Instruments Technology: Theory 2 h, Laboratory 2 h	SBM
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Optical windows, diaphragms, population concept, disturbances, prism, dispersion, prism spectrometer, diffraction grating, diffraction spectroscopy, camera, magnifier, microscope, telescope, thermal light detectors, optical light detectors, noise and sensitivity, image detection, , operating principles of optical instruments.

SEMESTER E

E1	Ocular Pharmacology: Theory 3 h	SBM
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General principles of pharmacodynamic pharmacology. Absorption, distribution and metabolism of drugs. Mechanism of drug action. Medicines and their use in ophthalmology. The autonomic nervous system: anatomy and physiology. Mechanisms of action of drugs used in ophthalmology. Principles of pharmacological treatment of ocular disease. Drug interactions. Introduction of therapeutic substances to optometric practice.

E2	Clinical Optometry I: Theory 4 h, Laboratory 2 h	SM
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Supervised clinical work between Optics and Optometry students. Monitoring of patients in external Clinics of Private and Public Ophthalmological Centers and Clinics. Presentation of cases.

E3	Machine vision: Theory 2 h	SBM
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Familiarization with the basic principles and methodology of machine vision. Emphasis on algorithms and applications of machine vision. Topics such as: Nature of vision (recognition process, scene and object analysis) are covered. Concept of black and white and color image. Image formation, mathematical, geometric, color, frequency, and discrete model. Basic image processing techniques (filtering, amplification, normalization).

E4	Optometric Informatics: Theory 2h, Laboratory 2 h	GBM
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Basic principles of Information Systems, Healthcare Information Systems (protocols, classification, encoding, communication and telemedicine). Artificial intelligence and medicine. Virtual reality systems. Medical imaging.

E5	Optics & Optometry Deontology: Theory 2 h	SBM
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Ethics of Optician – Optometrist. Philosophy of ethics in health science professions. Health science professions. Law and community. Ethics and religion. Human rights.

E6	Contact Lenses I: Theory 4 h, Laboratory 4 h	SM
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Examination procedures for contact lens fitting. Principles of contact lens fitting. Contact lens optics. Contact lens complications. Contact lens materials. Study and design of contact lenses. Contact lens pressure on the eye. Latest developments in contact lenses. Rigid, toric, keratoconic and therapeutic contact lenses. Fitting of contact lenses – practical work. Techniques on contact lens verification. Cleaning and sterilization of contact lenses. Contact lens complications due to contact lenses. Managing patients with optical anomalies. Contact lens solutions.

E7	Health and Safety: Theory 2 h	SBM
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Safety and risk management issues in workplaces where health science professions are practiced. In detail: health and safety legislation, safety organisation, safety management systems, written evaluation of professional hazard, risk assessment, prevention of accidents in health science professions, accident studies, contractors – choice of contractors, occupational health, high technology instruments, personal protection media, ergonomics, electrical hazards, chemical hazards, lighting, fire safety, lifting, radiation, noise.

SEMESTER F

F1	Clinical Refraction: Theory 3 h, Laboratory 2 h	SM
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Refractive Eye Status: Emmeropia, Ammetropia, Myopia (nearsightedness), Hyperopia (farsightedness), Astigmatism, Anisometropia and Anosoikonia, Adaptation, Aphakia and Pseudopahakia, Field of Vision, Evening Vision. Objective and subjective refraction. Complete

Eye Refractive Test: History taking, Eye Mobility examination, Direct and Indirect Ophthalmoscopy, Vision and Visual Acuity, Optotypes, Retinoscopy, Refractometry, Javal keratometry, Pelli-Robson contrast sensitivity test). Treatment of patients: infants, children and adults.

F2	Paediatric Optometry & Elderly Optometry: Theory 3 h, Laboratory 2 h	SM
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Development of vision in infants and children; binocular coordination. Optometric practice for infants and children. Anomalies of binocular vision. Optometry for athletes. Learning disabilities and vision. Study on idiopathic and congenital anomalies of eye movements: strabismus and heterophoria. Eye and vision problems in elderly. Low vision. Scientific ways of rehabilitation. Providing advice. Patient referral. Optics of low vision aids.

F3	Clinical Optometry II: Theory 4 h, Laboratory 2 h	SM
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Evolution of eyes and vision of vertebrates and invertebrates. Ocular ametropia, aspheric eye. Optical abilities. Vision disorders and symptoms. Vision and its association with the rest of the human senses. What is Vision Training. When and in which cases is Vision Training used. The relationship between vision and learning in the school environment. What should parents and teachers know and care about normal vision.

F4	Health Psychology: Theory 2h	SBM
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Psychology, Intelligence, Personality and Adaptation, Mental Health. Psychology of the child, adolescent, senior, Psychology of the patient. People with disabilities and their families. Methods of psychotherapy.

F5	Costing & Pricing – Marketing: Theory 2 h	SBM
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Probability theory – applications. Data distribution. Information theory. Information theory quantities. Entropy. Mutual information. Statistical data processing. Stochastic processes, autocorrelation matrix, decorrelation processes, Multidimensional domain reduction

techniques. Markov chain. Markov models. Pattern recognition techniques. Fuzzy logic principles. Neural networks and applications. Data mining, Clustering, Classification, Association rules, Temporal mining, Pattern comparison techniques.

F6	Contact Lenses II & Clinical Practice: Theory 4 h, Laboratory 4 h	SM
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Cornea and contact lenses (CL): oxygenation, CL movement, CL complications (special cases) and their identification – up-to-date bibliography. CL and possible CL wearer: patient approach/ briefing on CL, eye examination for CL fitting, patient suitability for CL wear, type of lens suitable for each patient, correct lens fit (best fitting, best visual acuity), training the new CL wearer (lens insertion/ removal, lens care), follow-up of the CL wearer (recognition of CL complications, lid eversion). Fitting different types of CL: spherical, astigmatic, soft, rigid. Fitting children, teenagers, presbyops and others. CL practical work in the University clinics - with supervision.

SEMESTER G

G1	Methodology of Research in Optics & Optometry: Theory 3 h	SBM
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Basics of research. The research question. Article review. Research deontology and research protocol. Parameter types. Non-experimental studies. Confidentiality. Experimental studies in Optics & Optometry. Study announcement. Credibility issues.

G2	Orthoptics & Binocular Vision: Theory 4 h, Laboratory 2 h	SM
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Diagnosis and treatment of binocular vision anomalies. Eye movements, binocular coordination. Detection and recovery of oculomotor muscle anomalies. Amblyopia, esophoria, exophoria. Vision treatment with prisms, lenses, and visual therapy (not

pharmaceutical or surgical). Eye aberrations. Measurements of eye dimensions. Disorders of binocular vision.

The normal eye muscular system: ocular muscles and eye movements. Physiological binocular vision: development, stereopsis, stereoscopy and stereograms, dominant eye. Coordination of eye movements. Measurement of ocular dimensions. Nature of Binocular Disorders. Diagnosis and treatment of binocular vision problems: accommodation and convergence, diplopia,

G3	Laser Technology: Theory 3 h	SBM
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Principles of Laser operation: Spontaneous and stimulated emission. Absorption. The idea of a Laser. Pumping configurations. Properties of Laser beams. Interaction of radiation and matter. Pumping processes. Passive optical cavities. Q-switching. Mode locking. Types of Lasers. Laser applications.

G4	Clinical Applications of Refraction & Optometry: Theory 3 h, Laboratory 4 h	SM
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Practice of refraction and optometry in optics & optometry clinics/laboratories. Observation of refraction and optometry cases at Public Nursing Institutions or Private Ophthalmological Centers. Presentation of cases in open days at the school.

G5	Contemporary Optical Applications: Theory 3 h	SM
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Biophotonics (interaction of laser radiation with tissue, photodynamic therapies of cancer). Optical Coherent Tomography, Confocal Microscopy, Nonlinear Microscopy, Optical Trapping and Applications in Biology and Medicine. Holography, Optical data storage and processing of information. Optical Integrated Circuits. Optical computers. Fluorescence Spectroscopy. Optic processing of materials.

G6	Low Vision Aids: Theory 4 h, Laboratory 2 h	SM
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Loss of vision. Definition and legislation of low vision. Causes and cases of low vision patients. Measurement of visual perception in people with low vision. Magnification. Non-visual aids. Light and room lighting. Optical Fields of View, Amsler Chart, Perimetry. Low vision aids to enlarge peripheral field of vision. Eccentric vision. Environmental and spatial modifications to make more functional and independent the visual impaired individuals. Treatment of patients with low vision. Understanding and training on correct prescribing, execution, explanation and techniques for using low vision aids such as magnifying glasses (hand and static), telescopes, complex prescriptions, CCTV.

SEMESTER H

H1	Dissertation Thesis	
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Supervised research study on a project relevant to Optometry or optical science in general, including clinical and theoretical research.

H2	Practical Training/ Placement	-
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Six month practical training/ placement into NHS or private Vision centres.