

**MADONNA UNIVERSITY, NIGERIA  
ELELE, RIVERS STATE**

**FACULTY OF HEALTH SCIENCES**

**DEPARTMENT OF OPTOMETRY  
STUDENT'S HANDBOOK**

**ACADEMIC PROGRAMME: DOCTOR OF OPTOMETRY (OD)**

**REVISED VERSION, 2016**

**BRIEF HISTORY OF THE DEPARTMENT**

The Department of Optometry, Madonna University, Nigeria offering a six-year degree programme leading to the award of Doctor of Optometry (O.D) was established in 2004 in the Faculty of Health sciences. The Department is poised to sustain the motto of the University, which is 'Decency in Morals and Education'. The programme is designed to expose the student to the knowledge and skills needed to provide primary eye care as well as specialty care in all facets of optometry. The first set of students graduated in 2009 and several sets of students have since graduated from the program.

### ***Philosophy***

The philosophy of the Optometry programme encompasses teaching, research and service to mankind with dignity. Every subfield of optometry is constantly advancing in technological endeavors, consequently, the body of knowledge and skill necessary to cope with these advances need to be regularly reflected in the curriculum used in training of students and reviewed from time to time.

### ***Aims***

To instill in students, the knowledge and skill needed to practice optometry profession effectively and efficiently, and the need to be competent in all its applications in different contexts for the benefit of humanity worldwide.

### ***Objectives***

- i. To provide students with a broad and balanced foundation of knowledge as well as practical and clinical skills in optometry.
- ii. To develop in students the ability to apply the acquired knowledge and skills to the solution of theoretical and practical problems in optometry.
- iii. To develop in students through an education in optometry, a wide range of transferable skills of value in optometry and non-optometry related employment and services.
- iv. To provide students with knowledge with which they can proceed to further studies in specialized areas of optometry.
- v. To train optometrists that can effectively and safely use diagnostic and therapeutic ocular pharmaceutical preparations as enshrined in the Act of Parliament Chapter 9 (Cap 09) in the laws of the Federal Republic of Nigeria.
- vi. To empower the student to appreciate the importance of optometry in all clinical, industrial, economic, environmental and social contexts.
- vii. To produce Doctors of Optometry who have acquired in-depth knowledge, expertise, skill and ethical orientation to practice the profession of Optometry in any part of the world.
- viii. To produce Optometrist who have the necessary knowledge to teach, conduct research and make advances in the profession.
- ix. To produce Optometrists versed in managerial acumen to take leadership positions in the health care delivery system.

### ***Learning outcomes***

#### **(a) *Regime of subject knowledge***

It is expected that at the end of the O.D programme, student must be proficient in:

- (i) Handling both diagnostic and major therapeutic ophthalmic drugs.
- (ii) Effective use of the ophthalmoscope, slit-lamp biomicroscope, retinoscope, tonometer, visual field equipment and other modern eye care diagnostic equipment.
- (iii) Ophthalmic dispensing.
- (iv) Being able to function effectively in interdisciplinary eye care team whether in a hospital, industrial or any other setting.
- (v) Community /public ocular health services.

#### **(b) *Competencies and skills***

At the O.D level, students are expected to have developed a wide range of different abilities and skills. Some of the main abilities and skill expected of students at the end of the O.D. Programme are as follows:

- (i) Optometric-related cognitive abilities and skills.
- (ii) Ability to recognize and analyze ophthalmic problem/s and plan strategies for their solution/s.
- (iii) Skills in the evaluation of clinical cases and interpretation of ophthalmic/clinical information and data.
- (iv) Skills in presenting clinical cases clearly and correctly, both orally and in writing to a range of informed audiences.
- (iv) Skills in information technology processes such as word-processing and spreadsheet use, data logging and storage, internet communication etcetera.

(c) ***Behavioral attributes***

An O.D degree holder should have the following attributes:

- \* Integrity and commitment to sanctity of facts.
- \* Demonstrate tolerance and accommodation to their patients and colleagues, irrespective of social and other differences; as a reflection of bias-free attitudes acquired through training.
- \* Conversant with acceptable professional ethics in handling patient information.
- \* Subscribe to acceptable professional ethics on the handling of dangerous micro-organisms in relation to storage, transportation and use in research.
- \* Subscribe to acceptable clinical ethics and restraints in the use of diagnostic and therapeutic preparations and medications.

**Specialized interests**

Current specialized interest areas in the department include the following:

- a) Pediatric optometry
- b) Contact lenses
- c) Binocular vision
- d) Low vision
- e) Ocular diseases
- f) Ocular diagnostics.

**Teaching and assessment modalities**

***Teaching***

Optometry courses (clinical and non-clinical) are taught by internal and external staff who are qualified optometrists. Modern equipment and current teaching techniques are used in teaching and assessment of students. Basic medical courses (Anatomy, Physiology, Biochemistry, Microbiology, Pharmacology,

biostatistics *etc.*) are taught by qualified lecturers from the medical school. General studies which include languages, sciences, computer studies, social sciences *etc* are taught by lecturers within the University. Unit hours of taught courses range from 1 to 3 Unit load for all lecturers.

Teachings are done by the use of power points projectors. Markers on white board are also used in teaching. Laboratory practical and clinical techniques are taught by the full time departmental staff and adjunct lecturers who are sourced both locally and internationally.

### ***Assessment***

The procedures used for assessment of students correspond to the knowledge, abilities and skills that are to be developed in the degree programme. Assessments are in the forms of the following:

- Formal examinations
- Laboratory reports/ records
- Problem-solving exercises
- Oral presentations
- Planning, conducting and reporting of research project work

### ***Research***

There are several research projects being undertaken in the department. Staff and students are involved in research in ocular health, community health optometry, and the visual sciences. Also, the department is involved in interdisciplinary research endeavors. Areas of research interest include refractive errors, colour vision, ocular health, blindness prevention, *etcetera*.

## **JOB OPPORTUNITIES**

**Doctors of optometry can practice the profession in the following settings:**

- (a) Eye clinics in both private and public organizations.
- (b) Teaching / lecturing in universities, polytechnics, colleges of education, etc.
- (b) Join the medical corps of Armed Forces, Police, Immigration, Custom services, Federal Road Safety Commission etc.
- (c) Work as research fellows in research institutes, universities, etc.
- (e) Work as consultants to Companies, Ministries, Parastatals, *etc.*
- (f) Work as environmental vision consultants in the workplace and sports.
- (g) Work as Public Health practitioners.

## **ADMISSION REQUIREMENTS**

**(a) Unified Tertiary Matriculation Examination (UTME)**

Candidates seeking admission into the Doctor of Optometry (O.D) degree programme must have: A good score in the prescribed Unified Tertiary Matriculation Examination (UTME) for admission into the first year of the 6-year programme. The candidate must have a Unit in English, Mathematics, Physics, Chemistry, and Biology. In addition, the student must satisfy the university matriculation requirements, with Units at WASC, GCE, or NECO, O' level in the relevant subjects. **The relevant courses must be passed at one sitting in each Examination Board category.**

**(b) Direct Entry:**

- (i) For direct admission into the second year (200 level) of the programme, the candidate must have passed 2 of the relevant subjects (Physics, Chemistry and Biology) at advanced level of the General Certificate of Education (G.C.E) or its equivalent.
- (ii) A Bachelor's degree (BSc) in any basic sciences, medical science or health sciences from a recognized university with a minimum of second class lower division.
- (iii) A Higher National Diploma (HND) in any relevant science programme (merit) from a recognized institution. They must also pass the general study courses done at 100 and 200 levels.
- (iv) Merit in Higher Diploma in Dispensing Opticianry is acceptable.

NOTE: All candidates for direct entry must fulfill all the UTME entry requirements. Also, they must take and pass the general study courses done at 100 and 200 levels.

**UNIVERSITY TRANSFERS**

**(a) Inter-University Transfers:**

Below are criteria which must be fulfilled before an inter-university transfer could be considered. Candidates are advised to read these criteria carefully.

- (1) Any candidate seeking transfer from another university to the department of Optometry, Madonna University, must satisfy the departmental admission requirements as stipulated in the section titled "ADMISSION REQUIREMENTS"
- (2) To qualify, the candidate must be transferring from another Optometry programme.
- (3) The transfers must preferably be between 100 and 200 levels. However, occasionally, 300 level transfers may be considered if there is a good reason for such transfer. Such category of students must have passed all 100 and 200 level courses at his / her former school. Transfers from 400 level and above is absolutely NOT allowed.
- (4) Also some courses not in the former university brochure but are in the Madonna University brochure must be taken and passed.
- (5) Also, a cumulative grade point average (CGPA) of 3.50 must be achieved before transfer.
- (6) Transfer must not be due to any type of misconduct in the former university.

**(b) Intra-University transfer**

**Madonna University students seeking transfer into the Optometry programme.**

These students must satisfy all the requirements as stated in the category of students for inter-University transfer.

Transferring candidate must submit a letter of release which should include reason for transfer from the Registrar, the Dean and the Head of Department. It is important to note that, whatever the Department / Faculty the candidate is transferring from, an accumulative grade point average (GPA) of 3.50 must be achieved by the candidate.

### **PROGRAMME STRUCTURE**

The Department of Optometry, Madonna University runs a six-year unclassified Doctor of Optometry degree Programme. The Programme is geared towards training students to become competent professional optometrists. Courses to be taken include Basic Sciences (Physics, Chemistry, Biology, Mathematics); Social Sciences (Philosophy, Theology, Information Sciences, People and Culture, Psychology, Peace and Conflict resolution, Bioethicset *cetera*); Languages (English, French and German); Basic medical sciences (Anatomy, Physiology, Biochemistry, Microbiology, Biostatistics *et cetera*) and optometry courses which include: Optics, Clinical optometry, Contact lenses, Pediatric optometry, Binocular vision, Geriatric optometry, Practice management, Low vision, Public Health, Ocular diseases, Environmental optometry *et cetera*.

The Programme also prepares the Doctor of Optometry graduating students for the numerous areas of specialization in the profession of Optometry, which include the following:

1. Primary care Optometry.
2. Cornea and contact lens care.
3. Pediatric optometry.
4. Orthoptics
5. Ocular Health Sciences
6. Low vision and Rehabilitative Optometry.
7. Environmental and Public Health Optometry
8. Vision Science.

### **REGISTRATION WITH THE PROFESSIONAL BOARD**

When the student has fulfilled all requirements for graduation, he /she is considered to be an optometrist and is recommended by the department for registration as an Optometrist by the Optometrists and Dispensing Opticians Registration Board of Nigeria following oath taking ceremony for the graduate. The Optometrist subsequently undergoes a one-year Internship programme organized by the Board of Optometry.

### **COURSE CODING INDEX (subject areas).**

The course codes used in the Department are made up of three letters indicating the subject area (e.g. OPT for Optometry) and a three-digit number (e.g. 120). The first digit represents the level of the course, i.e. 1 for 100 levels, 2 for 200 level, 3 for 300 levels *etc.* The second digit indicates the stress area of the course as shown in the table above; and the third digit indicates the semester. Odd numbers represent first semester and even numbers indicate second semester.

<b>TABLE SHOWING THE STRESS AREAS</b>	<b>CODES</b>
Optometry (Introduction, General, Labs, Clinics, etc)	0
Optics (including dispensing courses)	1
Contact Lens	2
Ocular Health (Pathology, Pharmacology)	3
Rehabilitative Optometry	4
Binocular vision and Orthoptics	5
Public Health	6
Seminar	7
Research/Project	9

(v) Guidelines for prerequisites must be adhered to.

(vi) All students registering for 500 level courses must have passed all 100 - 400 level courses; or else, probate so as to enable the student clear all the 100 -400 level courses not passed.

(vii) All clinical courses at 500 levels must be passed before entry to 600 levels.

(ix) Before entering final year (600 Level), the student must NOT have more than 10 Unit load of carry overs.

(x) The student should pass with a minimum of 30 Units before going to the next class (from 100 to 500 levels).  
The student must NOT proceed to the next class with more than 15 Units of carry-over courses.

#### **PUNISHMENT FOR VARIOUS EXAMINATION MISCONDUCTS**

<b>S/N</b>	<b>NATURE OF OFFENCE</b>	<b>PRESCRIBED PUNISHMENT</b>
A	Any student caught with a piece of paper, GSM phone or gadget containing relevant information pertaining to the examination	Rustication for one (1) academic session
B	Second offender for one above	Expulsion
C	Impersonation during examination	Expulsion of the student(s)
D	Fighting examination supervisor, invigilator etc	Expulsion
E	Unauthorized handling of examination question papers	Expulsion
F	Exchange of answer booklets	Rustication for one academic session
G	Exchange of material in the examination hall	As above
H	Collaborative copying in the examination hall	Rustication for one academic session. Expel at a repeat of the offense.
I	Smuggling of question paper in or out of the examination hall	Rustication for one academic session.
J	Refusal to appear before a panel	Rustication for one academic session
K	Forging/ altering result grades and signature of officials	Expulsion
L	Threatening a staff or members of their families verbally or in writing	Expulsion

m	Procuring and altering a medical certificate in order to obtain a deferment of examination	Rustication for one academic session
N	Sorting/ altering of examination grades by whatever means	Rustication for one academic session
O	Submission of forged registration materials including add/drop card	Rustication for one academic session
P	Talking in the examination hall	Appearance before examination malpractice panel.



### **INSTRUCTION TO DIRECT ENTRY STUDENTS**

Students who gained admission by direct entry into the 200 level will ensure that they register and pass the following General Studies Courses in addition to all the courses in the Faculty/Departmental curriculum, as applicable.

#### **FIRST SEMESTER (FOR DIRECT ENTRY STUDENTS)**

<b>Course Code</b>	<b>Course Title</b>	<b>Unit</b>
GST 111	Communication in English I	2
GST 113	Nigerian Peoples and Culture	2
GST 121	Use of Library, Study Skills and Information Technology	2
GST 123	Communication in French	2
GST 125	Introduction to Entrepreneurship Studies I	2

#### **SECOND SEMESTER (FOR DIRECT ENTRY STUDENTS)**

<b>Course Code</b>	<b>Course Title</b>	<b>Unit</b>
GST 104	Fundamental Philosophy	1
GST 112	Logic, Philosophy and Human Existence	2
GST 122	Communication in English II	2
GST 142	Communication in German	2
GST 162	Introduction to Social Science	2

**100 LEVELS, FIRST SEMESTER**

<b>REQUIRED ANCILLARY COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
BIO 101	General Biology I	3
PHY 101	General Physics I	3
CHM 101	General Chemistry I	3
MTH 101	General Mathematics I	3
PHY 105	General Physics Laboratory I	1
CHM 171	General Chemistry Practical I	1
<b>GENERAL STUDIES COURSES (GST)</b>		
GST 111	Communication in English I	2
GST 113	Nigerian Peoples & Culture	2
GST 121	Use of Library Study Skills and Information Technology (ICT)	2
GST 123	Communication in French	2
GST 125	Introduction to entrepreneurship studies I	2
<b>Total</b>		<b>24</b>

**SECOND SEMESTER**

<b>REQUIRED ANCILLARY COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
BIO 102	General Biology II	3
PHY 104	General Physics III	3
CHM 102	General Chemistry II	3
MTH 102	General Mathematics II	3
BIO172	General Biology Practical	1
PHY 106	General Physics Laboratory II	1
CHM 172	General Chemistry Practical II	1
CSC 104	Introduction to Computer Science	2
<b>GENERAL STUDIES COURSES (GST)</b>		
GST 112	Logic, Philosophy & Human existence	2
GST 122	Communication in English II	2

GST 162	Introduction to Social Sciences	2
	<b>Total</b>	<b>23</b>

**200 LEVEL****FIRST SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 201	Geometrical Optics	2
<b>REQUIRED ANCILLARY COURSES</b>		
ANT 201	Introductory Anatomy, gross anatomy of thorax and histology of basic tissues.	3
PIO 201	General Principles and Blood Physiology	3
BCH 201	General Biochemistry	3
MCB 211	Introductory Microbiology	3
BIO 211	Introductory Genetics	2
BCH 213	Biochemistry Practical	1
PUH 257	Medical Sociology	2

<b>GENERAL STUDIES COURSES (GST)</b>		
GST 211	Fundamental Theology	1
GST 215	Introduction to Entrepreneurship Studies II	2
	<b>Total</b>	<b>20</b>

**SECOND SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 202	History / Introduction to Optometry	2
OPT 212	Physical Optics	2
<b>REQUIRED ANCILLARY COURSES</b>		
ANT 216	Gross Anatomy of abdomen, pelvis, perineum, head and neck.	3
PIO 222	Human Physiology II	3
BCH 212	Functional Biochemistry	3
<b>GENERAL STUDIES COURSES (GST)</b>		
GST 102	Fundamental Philosophy	1
GST 142	Communication in German	1
GST 222	Peace & Conflict Resolution Studies	2
GST 224	Fundamental Ethics	1

GST 252	Bioethics	1
	<b>TOTAL</b>	<b>19</b>

**300 LEVELS****FIRST SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 301	General Optometry I	3
OPT 311	Ophthalmic Optics I	2
OPT 313	Physiological Optics I	2
OPT 315	Dispensing Optics	2
OPT 331	Ocular Anatomy	2
OPT 335	Ocular Biochemistry	2
<b>REQUIRED ANCILLARY COURSES</b>		
PCO 321	General Pharmacology	3
ANT 335	Neuroanatomy	3
	<b>TOTAL</b>	<b>19</b>

**SECOND SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 302	General Optometry II	3
OPT 310	Bacteriology and Immunology	2
OPT 312	Ophthalmic Optics II	2
OPT 314	Physiological Optics II	2
OPT 316	Dispensing Optics Laboratory	1
OPT 336	Ocular Physiology	3
OPT 362	Developmental Psychology	2
OPT 392	Biostatistics	2
<b>REQUIRED ANCILLARY COURSE</b>		
PIO 334	Neurophysiology	2
	<b>TOTAL</b>	<b>19</b>

**400 LEVELS  
FIRST SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 401	Diagnostic Optometry I (Theory and Clinic)	3
OPT 403	Clinical Procedure And Practice I (Theory and Clinic)	3
OPT 407	Optometric Instrumentation	2
OPT 413	Physiological Optics III	2
OPT 421	Contact Lens I (Theory)	2
OPT 431	General Pathology	3
OPT437	Ocular Pharmacology and Toxicology	2
OPT 461	General Epidemiology	2
	<b>TOTAL</b>	<b>19</b>

**SECOND SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT402	Diagnostic Optometry II (Theory and Clinic)	3
OPT 404	Clinical Procedure and Practice II ( Theory and Clinic)	3
OPT 416	Clinical Dispensing of Ophthalmic lenses	2
OPT 422	Contact Lens II (Theory and Clinic)	2
OPT 432	Ocular Pathology I	3
OPT 438	Ocular pharmacology and Therapeutics	3
OPT452	Anomalies Of Binocular Vision	2
OPT 462	Applied Psychology For Optometrists	2
	<b>TOTAL</b>	<b>20</b>

**500 LEVELS  
FIRST SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 501	Clinical Procedure And Practice III (Clinic)	3
OPT 503	Pediatric Optometry (Theory and Clinic)	2
OPT 507	Visual Analysis	2
OPT 521	Contact Lens Clinic ( Clinic)	2
OPT 533	Ocular Pathology II	2
OPT 551	Orthoptics ( Theory and Clinical)	2
OPT 561	Environmental Vision	2
OPT 563	Preventive optometry	2
OPT 591	Scientific Research Methods	2
	<b>TOTAL</b>	<b>19</b>

**SECOND SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 500	Practice Management	2
OPT 502	Clinical Procedure and Practice IV	3
OPT 504	Geriatric Optometry	2
OPT 534	Ocular Pathology III	2
OPT 542	Low Vision and Ocular Prosthesis	2
OPT 564	Medical Law, Ethics & Jurisprudence	2
OPT 566	Endocrinology and Nutrition	2
	<b>TOTAL</b>	<b>18</b>



**600 LEVEL  
FIRST SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 605	Clinical Posting (Externship)/ Report	9
OPT 671	Seminar on Externship	3
OPT 673	Seminar on Current Eye and Vision Research	3
	<b>TOTAL</b>	<b>15</b>

**SECOND SEMESTER**

<b>MAJOR COURSES</b>		
<b>CODE</b>	<b>TITLE</b>	<b>UNITS</b>
OPT 602	Primary Eye Care	6
OPT 604	Hospital Practice	2
OPT 606	Community Eye Health	2
OPT 634	Advances in Optometry	2
OPT 692	Research Project	6
	<b>TOTAL</b>	<b>18</b>

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**FIRST SEMESTER (FOR DIRECT ENTRY STUDENTS)**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
GST 111	Communication in English I	2
GST 113	Nigerian Peoples and Culture	2
GST 121	Use of Library, Study Skills and Information Technology	2
GST 123	Communication in French	2

GST 125 Introduction to Entrepreneurship Studies I 2

**SECOND SEMESTER (FOR DIRECT ENTRY STUDENTS)**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
GST 104	Fundamental Philosophy	1
GST 112	Logic, Philosophy and Human Existence	2
GST 122	Communication in French	2
GST 142	Communication in German	2
GST 162	Introduction to Social Science	2

**COURSE DESCRIPTION**

**BIO 101: General Biology 1 (3 Units)**

- Cell structures and organization, plant and animal cells, functions of cellular organelles, diversity and characteristics of living things. General reproduction, mitosis, meiosis, abnormalities associated with gene crossing, heredity and evolution. Concept of ecology and types of habitats, diversity of plants and animals. Food chains and food webs, interrelationship of organisms. Elementary biochemistry of carbohydrates, proteins, lipids and nucleic acids.

**PHY 101: General Physics 1 (3Units)**

- Measurements, units and dimensions. Linear motion. Relevance of linear kinematics to science and physiological effects of accelerations. Motion in a circle and simple harmonic motion. Mechanics: scalars and vectors addition and resolution of vectors. Simple experiments in mechanics and properties of matter. Properties of metals. Rectilinear motion and Newton's law of motion; inertial mass and gravitational mass; free fall; projectile motion; deflecting forces and circular motion; Newton's law of gravitation; satellites, escape case velocity; gravitational potential; potential well, special case of circular motion; momentum and the conservation of a momentum; work power energy for a gravitational field and electric bodies. Thermal physics and properties of matters: temperature heat, work, heat capacities; second law Carnot cycle; thermodynamics ideals gas temperature scale; thermal conductivity radiation; black body and energy spectrum; Stelan's law kinetic model of gas; equation of state; concept of diffusion mean free path; molecular speeds; Avogadro's number; behavior of real gases. A model for a solid; crystalline structure; model for matter; inter-particle forces in solids, liquids and gases.

**CHM 101: General Chemistry 1(3Units)**

- Atomic structure and periodic table. Development of configuration of elements. Stoichiometry and mode concepts. Electronic theory of atoms and valence. Chemical bounding. Formulary and IUPAC basic nomenclature of compounds. Concept of matter. Law of chemical combination by mass. Wave

theory, principle of quantum mechanics. Periodic table and periodicity of fundamental properties. Hydrogen,

- Nuclear chemistry and Radioactivity and their application. General study groups to emphasis periodicity. Selected transition elements.

#### **MTH 101: General mathematics 1 (3 Units)**

- Real number system: Simple definition of integrals, rational and irrational numbers. The principle of mathematical induction; real sequences and series, elementary notion of convergence of geometry, arithmetic and other simple series; theory of quadratic equations.
- Simple inequalities: absolute values and the triangle inequality.
- Identities; partial fraction.
- Sets and subsets: Union, intersection, compliments, properties of some binary operations of sets: distributive, closure associative; commutative laws with examples. Relations in a set: Equivalence relation; Properties of set functions and inverse functions.
- Permutations and trigonometric function of angle of any magnitude. Addition and factor formulae.
- Complex numbers: Algebra of complex numbers. The Argand diagram, the de Moivr's theorem, the root of unity.

#### **PHY 105: General Physics practical 1 (1 Unit)**

This is a laboratory-based course, and thus we emphasize on qualitative measurement. The treatment of measurement and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of matter; the oscilloscope; mechanical systems; electrical and mechanical resonant system, light; heat; viscosity etc. as covered in Physics 111.

#### **CHM 171: General Chemistry Practical 1(1 Unit)**

Structure of solid. Kinetic theory of gases and gas laws. Colligative properties of dilute solutions. Raout's law, Henry's law and Molecular weight determination. Thermo chemistry and Hess's law. Chemical Equilibrium. Law of mass action, reaction rate and chemical energetics. Electrochemistry .Ionic equilibrium. Theories of acids bases and indicators. Catalysis. Ionics. Phase equilibrium, one and two component system. Enthalpy, entropy and free energy.

#### **GST 111: Communication in English 1 (2 Units)**

The basic objective of the course, use of English, is to prepare the students to acquire certain language skills to succeed in their courses and in the society. The course teaches ability to read, comprehend, interpret, and summarize materials from various registers and styles reflecting various disciplines or subject of study; ability to apply the knowledge of the structure, vocabulary, idioms, oral forms and general patterns of the English language:

- Vocabulary Development: Word Roots, Affixes, Synonyms, Antonyms, Homonyms, Homophs, and Homographs.
- Denotation and connotation, Collocations, Idiomatic expression, Figures of speech and Proverbs-similes and Metaphors, etc.
- Registers, Formal informal speech Patterns, Slang Reference.
- Parts of Speech and Word Functions in Sentences.
- Paragraph Writing, Coherence and Spellings.
- Punctuation and Capitalization, Spellings.
- Study Skills: Developing Effective Listening Technique Aids to Listening; What to Listen to; Listening for Instructions. Note Making Skills.
- Using the Dictionary, Pronunciation, Consonants, Vowels etc

### **GST 113: Nigerian Peoples & Culture (2 Units)**

This course will emphasize on the social issue of current significance and their impact on individuals / groups etc, concepts, sociological schools of thought, family formation processes, cultural practices and the health of the individual / community e.g., FGM, child labour etc, Roles classifications.

### **GST 121: The use of library and study skills and ICT (2 Units)**

Brief history of libraries; library and education; university libraries and other types of libraries; study skills (reference services); types of library materials; using resources including e-learning, e-material etc. Understanding library catalogues (card, OPAC etc) and classification; copying and its implications; database resources; bibliographic citations and referencing; study techniques and basic research methods.

### **GST 123: Communication in French (2 Units)**

Introduction to French alphabets and numeracy for effective communication (written and oral); conjugation and simple sentence construction based on communication approach, sentence construction; comprehensive and reading of simple.

### **GST 125: Introduction to Entrepreneurial Studies (2 Units)**

Introduction to entrepreneurship and new venture creation; entrepreneurship in theory and practice, the opportunity, forms of business, staffing, marketing and the new venture. Determining capital requirements, raising capital, financial planning and management. Starting a new business feasibility studies, innovation, legal issues, insurance and environmental considerations.

## **100 LEVEL**

### **SECOND SEMESTER**

### **BIO 102: General Biology II (3 Units)**

Ecology, ecosystems, biotic and abiotic factor, interrelationship between animals and plants. Adaptation of plants and animals to their environments. Types of population dynamics, static, climax communities, types and

factors affecting them. Edaphic factors, rainfall, wind, relative humidity, light intensity etc. Modification of the nature ecosystem.

**PHY 104 General Physics III (3Units)**

Propagation of light at plain and curved surfaces. The human eye, photosensitive pigments in the eye, colour vision and insect eye. Optical instruments; ophthalmoscope and compound microscope. Radioactivity and useful effects of radiation. Current and static electricity. Introductory magnetism and alternating current. Introductory atomic physics and electronics. Practicals; vibrations and optics magnetism.

**CHM 102: General Chemistry (3 Units)**

Historic survey on the development and importance of organic chemistry. IUPAC nomenclature and classification of organic compounds. Homologous series. Elemental analysis and molecular formula, structure isomerism, isolation and purification methods, concepts of functional group resonance and aromatics. Electronic theory in organic chemistry, saturated and unsaturated hydrocarbons, cyclohydro-carboxylic acids amines and aromatic compounds. Comparison of phenols and alcohols.

**MTH 102: General Mathematics II (3Units)**

The course consists of geometric representation of vectors in 1, 3 dimensions, components direction cosines; addition of scalar, multiplication of vectors; linear independents; scalar and vector products of two vector; differential and integration of vectors.

**BIO 172: General Biology Practical (2 Units)**

Testing for the presence of food substances; diffusion and osmosis experiments. Observation of cells and tissues of selected plant and animal species. Investigations on physiological processes affecting photosynthesis; Observation of mitosis in onions bulb. Observation of cyst and ova of parasitic worms; Observation of fungi hyphae; Observation of bacterial cells; Preparation of microscopic slides; Basics of photometry; calorimetry, chromatography, electrophoresis.

**PHY 106 General Physics Practical II (1 Unit)**

Emphasis will be on the topics covered in Physics 122.

**CHM 172 General Practical Chemistry II (1 Unit)**

Preparation of organic compounds and other named compounds including their purification, separation of coloured compounds using chromatographic techniques e.g. paper and thin-layer chromatography, practice of solvent extraction techniques for liquids etc, preparation of double salts etc.

**CSC 104: Introduction to Computer Science (2 Units)**

Brief history of computers and computer generation. Classification of computers. Structure of a general-purpose computer. Number systems. The stored programme. Techniques of problem solving. Flowcharting, Stepwise refinement. Algorithm for searching, sorting and merging of ordered lists. Data preparation I / O devices. Data types. Data representation. Data capture problem-oriented languages. BASIC and FORTRAN programming: arithmetic expression; arrays; sequencing, alternation and iteration, sub-programmes and parameters. Elementary numerical Algorithms.

**GST 112: Logic, Philosophy & Human existence (2 Units)**

Etymological & predecessorial conception of philosophy, philosophy modes and methods, major branches of logic, logic & language, induction & deduction, fallacies, categorical proposition and categorical syllogism.

**GST 122: Communication in English 11 (2 Units)**

- Introduction, speaking for academic purpose and objectives. The communication process, speech situations, general guideline for effective speaking, organization, speaking at lectures, tutorials and seminars, asking and answering questions.
- Reading comprehension: the writer and the reader, actual reading activity; other reading comprehension skills.
- Continuous writing: the essay, acquiring writing skills, types of essays, approaches to essay writing; suggested topics for essay writing.
- General report writing: introduction, definition, types of reports, characteristics of reports, style, student research report, and review of literature.
- Report writing in the sciences: introduction, overall language use, model report; result and discussion of results; conclusion.
- Business correspondence: Introduction, general principle in writing business letter. Designing Curriculum Vitae (CV) or Resume'.
- The term paper: definition, choosing a topic, delimitations of a chosen topic, collecting material for term paper, compiling a working bibliography, compiling a reference list. The APA style.

Each unit covers 2 weeks work.

**GST 162: Introduction to Social Science (2 Units)**

Origin, definitions, problems and relevance of social science; sub fields of social science: common concepts in social science; history, meaning, theories and consequences to mankind; leaders and leadership; definitions, typologies: self-reliance and national development; development: meaning, indicators and scope; population growth and distribution in Nigeria, distribution of public goods through public agencies; personality: Issues and theories; interpersonal relationship; meaning and factors of development; love and intimate relationship; moral regeneration in Nigeria; causes, problems and the way forward; war and peace: definition, theories, classification and control of war; agents of peace: The League of Nations, U.N.O, O.A.U, E.C.O.W.A.S etc; the Media and National Development.

## **200 LEVEL, FIRST SEMESTER**

### **OPT 201: Geometrical Optics**

**(2Units)**

Basic properties of light- rectilinear propagation, refractive index, wavelength, wave fronts, shadows, pin- hole camera. Huygens's principle. Refraction at plane surfaces, curved surfaces. Refractive index, apparent depth. Ray tracing, nodal points, lateral magnification, thin lenses and coaxial systems of thin lenses. The spectrum, dispersion and color. Thick lenses. Aberrations – spherical, coma, oblique astigmatism, curvature of field, distortion, chromatic. Entrance and Exit pupils, Depth of focus, Depth of field, Field of view. Spherocylindrical lenses, Transposition, The prisms, Mirrors.

**Lecture Plan:** 3 hours of lectures/week.

Week 1/3: Basic properties of light- rectilinear propagation, refractive index, wavelength, wave fronts, shadows, pin- hole camera. Huygens's principle.

Week 4/5: Refraction at plane surfaces, curved surfaces. Refractive index, apparent depth.

Week 6/7: Ray tracing, nodal points, lateral magnification, thin lenses and coaxial systems of thin lenses.

Week 8: The spectrum, dispersion and color. Thick lenses.

Week 9/10: Aberrations – spherical, coma, oblique astigmatism, curvature of field, distortion, chromatic.

Week 11: Entrance and Exit pupils, Depth of focus, Depth of field, Field of view.

Week 12/13: Spherocylindrical lenses, Transposition, The prisms, Mirrors.

Week 14: Revision.

### **ANT 201: Introductory Anatomy, Gross anatomy of the thorax and histology of the basic tissues: (3 Units)**

#### **Upper limb**

**Shoulder Girdle:** bones, joint & muscles, vessels, brachial plexus, axilla, lymph nodes and mammary gland

**Arm:** Humerus and elbow joint, blood vessels, nerves, muscles.

**Forearm:** Bones, radial, ulnar. Blood vessels and nerves.

**Lower Limb: Pelvic Girdle: Hipbone, Sacrum.**

**Thigh:** Femur and hip joint, lumbar and sacral plexuses,

**Thigh:** Anterior compartment: muscles, blood vessels and nerves.

**Thigh:** Medial compartment muscles. Blood vessels and nerves.

**Thigh;** Posterior compartment muscle, blood vessels and nerves, knee joint.

**Gluteal region:** muscles, blood vessels and nerves.

**Leg:** Osteology of tibia & fibula.

**Leg:** Anterior lateral compartment: muscle, blood vessels and nerves.

**Leg:** Posterior compartment, muscle, blood vessels and nerves.

**Foot:** Bones, ankle joint, arches of the foot, muscles and vessels and nerves.

Introduction to embryology, introduction to the male and female genital system, gametogenesis. Uterine cycle, ovarian cycle, development of the Graffian follicles and ovulation: fertilization, cleavage, morula, blastocyst formation, implantation.

Bilaminar disc, amniotic cavity, yolk sac, trilaminar layer, intraembryonic coelom formation, primitive streak. The human embryo, placenta and fetal membranes and body cavities. Somites, blood and vessels formation, folding of the embryo, germ layer derivatives, estimating embryonic age, congenital anomalies.

Introduction to the cellular system of the body

Introduction to the primary tissues of the body: Epithelium, connective tissues, muscles, nerves, blood, and skeletal tissues.

### **PIO 201: General Principles and Blood Physiology (3 Units)**

Overview of physiology and its application: cellular physiology; homeostasis and homeostatic mechanism; physiology of the skin; nutrition and gastro-enterology; circulatory and cardiac physiology; renal physiology; respiratory physiology; reproductive fetal and neonatal physiology; endocrinology and neurophysiology; physiological measurements and factor affecting them. Neuromuscular systems.

### **BCH 201: General Biochemistry**

**(3 Units)**

General Biochemistry

Cellular biochemistry

Proteins

Structure and types

Mechanism of enzyme action

Bioenergetics and energy storage

Carbohydrate biochemistry- Structure and function. Glycolysis, TCA cycle Pentose monophosphate shunt

Gluconeogenesis

Glycogen synthesis storage and utilization

Oxidative phosphorylation

Mitochondrial structure

Electron transport /PH coupling

### **MCB 211: Introductory Microbiology (3 Units)**

History and scope of microbiology; the general characteristics of microorganisms. Prokaryotic and Eukaryotic microorganisms. Bacterial morphology and cell structure.

Growth and reproduction of microorganisms. Biochemical reactions of microorganisms, antimicrobial agents.

Systematic classification of bacteria, fungi, viruses, algae and protozoa.

### **BIO 211: Introductory Genetics (2 Units)**

History of Genetics, Pattern, particle and principle of heredity. Complete, incomplete dominance and co-dominance. Mendel's inheritance in human; multifactorial inheritance. Sex determination, sex linkages, eukaryotic chromosomes and theory of inheritance. Detailed structure of DNA, mechanism of DNA replication. Basic and normal control of cell division (Miosis and mitosis). Replication of DNA, genes expression (mutation, transformation and protein synthesis). Genetic recombination. Gene linkages and gene mapping. Location of genes along a chromosome. Direct detection of genotypes. Genetic analysis of populations and how



they evolve ( heritable and non-heritable characteristics, quantitative inheritance). Structure and organization of Drosophila genome, sex determination in Drosophila. Diseases at the level of the gene, mutations, recessive disorders ( homozygote recessive AA), hemophilia ( blood clotting problems). Diseases due to recessive allele; sex linked; sickle cell anaemia. Phenylketonuria; galactosemia. Syndromes and chromosomal disorders. Chromosomal rearrangement and genetic diseases. Methods of detection, pedigree analysis, origin of life on earth. Concept and theory of evolution.

**BCH 213: Biochemistry Practical (1 Unit)**

Review of general biochemistry; chemical elements and the periodic table. Electronic configuration, electronic orbital, valency of atoms and types of chemical bonds; metals and non- metals; acids and bases, highlighting Lewis conception; carbon, SP<sup>3</sup> hybridization, the tetrahedron and covalent bond; functional group. Water and its special properties. Carbohydrates: the glycosidic bond; relationship of photosynthesis and tissue respiration. Introduction of the cell and hierarchy of organization of living things. Macromolecules, organelles, cells, tissue, organs and organisms. Amino acids, proteins; the peptide bond and polypeptides; proteins as biological catalysts, immune agents and structural molecules. Carbohydrate as storage molecule of easily accessible metabolic energy. Fatty acids and lipids: the ester bond of lipids and triglycerides; Fat as efficient energy storage molecule. Nucleic acids and nucleotides: DNA and RNA as polymers of nucleotides; the phosphodiester bond; Gene and genetic information transcription and translation.

**PUH 257: Medical Sociology (2 Units)**

This course reviews the social issues in health with particular reference to the services offered such as welfare services, care of the motherless babies, and rehabilitation of the handicapped, care of the elderly and care of the destitute/beggars. The course also focuses on specific problems areas such as natural and man-made emergency situations, disasters and refuge problems. The course provides an opportunity for students to become acquainted with what happens in such situations.

**GST 211: Fundamental Theology (1 Unit)**

Fundamental Theology discusses the basic themes to Christian knowledge about God as public discourse, thus not in the form of a catechism or apologetics. Basic truths of Christian faith in open disposition to the world. This leads from Classical Apologetics by the Fathers of the Church remained cases of *defensor fidei* that is to say, in confrontational language to other systems of meaning within history, to recalcitrant powers persecuting the Church etc. Fundamental Theology does not remain merely on the defensive or on the offensive in the face of the European Project of Enlightenment. Faith and reason need to understand each other, like in Anselm's earlier project of 'fides quarens intellectus'.

**GST 215: Introduction to Entrepreneurial Skills II (2 Units)**

The course is a continuation of GST125 (Entrepreneurial studies I). Attention is given to management of people(personal management), materials management and purchasing, money (financial management); machinery (technology) management concept of marketing; market segmentation; product; price; promotion;

place; salesmanship; personal selling; available trade for entrepreneurs and decision making; students are expected to be exposed on some of the entrepreneurial skills.

## **200 LEVEL**

### **SECOND SEMESTER**

#### **OPT 202: History/ Introduction to Optometry (2 Units)**

Understanding Optometry as a health care profession. Relationship of the profession to others in the eye care field including Ophthalmology and Opticianry. Opportunities available to the Optometrist as a professional. Attitude necessary for the study and practice of optometry. A general knowledge of the legal status, standards of practice, professional conduct and association. Introduction to Optometric terms, instrumentation and literature. Optometry in America, Asia, Africa and Europe and the historical development and personalities involved; from the ancient times (day of Hammurabi); the middle centuries, the renaissance period; the seventeenth century; the eighteenth century. The golden age of optics till present period.

**Lecture plan:** 2 hours of lectures/ week

Week 1/2 Understanding Optometry as a health care profession. Relationship of the profession to others in the eye care field including Ophthalmology and Opticianry. Opportunities available to the Optometrist as a professional. Historical development of Optometry from the ancient times (day of Hammurabi).

Week 3. Opportunities available to the Optometrist as a professional. Historical development of Optometry in the middle centuries.

Week 4. Attitude necessary for the study and practice of Optometry. Historical development of Optometry from the renaissance period.

Week 5/7. A general knowledge of the legal status, standards of practice, professional conduct and association. Historical development of Optometry from the seventeenth century.

Week 8/11. Introduction to Optometric terms, instrumentation and literature. Historical development of Optometry from the eighteenth century.

Week 12/13. Optometry in America, Asia, Africa and Europe. Historical development of Optometry from the golden age of optics till present period.

Week 14: Revision

#### **OPT 212: Physical Optics (2Units)**

Principles of wave optics, interference, diffraction, polarization, radiometry, photometry. The quantum nature of light. Spectroscopy, lasers and relativistic optics. Gaussian theory: principal points and nodal points, equivalent power and vertex power, field lenses, eyepieces and telephoto lenses.

Lecture Plan: 3 hours of lectures/week.

Week 1/4: Principles of wave optics, interference, diffraction, polarization, radiometry, photometry.

Week 5/6: The quantum nature of light.

Week 7/8: Spectroscopy, lasers and relativistic optics.

Week 9/10: Gaussian theory: principal points and nodal points.

Week 11: Equivalent power and vertex power.

Week 12/13: Field lenses, eyepieces and telephoto lenses.

Week 14: Revision.

**ANT 216: Gross Anatomy II (Head/Neck; Abdomen /Pelvic/Perineum regions)**

**(3Units)**

Osteology skull and vertebrae

Triangles of the neck, cervical fascia and lymphatic drainage of the head, neck and back.

Pharynx and larynx.

Thyroid and parathyroid glands.

The pterygo-palatine fossae; nose and the paranasal sinuses, oral cavity.

Face and parotid gland.

Temporal and infratemporal fossae, scalp and cranial cavity

Dural sinuses, cranial nerves.

The ear and eye.

**PIO 222: Human Physiology II**

**(3 units)**

Renal system and body fluid including control of blood pressure and water balance control of plasma sodium and potassium levels, acid-base balance, etc. Circulatory system including cardiac cycle, blood flow and pressure, lymph formation and function etc. Endocrine system including hormones, pituitary gland, adrenal cortex, regulation of blood sugar levels, vitamin D, pregnancy and lactation, etc.

**BCH 212: Functional Biochemistry**

**(3 Units)**

Molecular biology, an introduction

DNA structure and function, RNA structure and function, DNA Replication,

Protein synthesis.

Biochemistry of specialized tissues viz:

Hormones and growth factors, Muscle, Liver, Nerve, Eye, Nutrition. Digestion of protein, carbohydrate and lipids, Essential amino acids, Minerals.

**GST 102: Fundamental Philosophy**

**(1 Unit)**

The basic themes of Philosophy reflect the cultural predispositions for an assent to truth, the essence of being, Existence and history. Thus an attempt at definition of philosophy, philosophy of the sciences, philosophy of value, theories of truth and general metaphysics pave the way for an understanding of philosophy as systematic (system as well ordered whole; systemic as system theories about self-organization in nature and science), which by all interest for the categorical (finite, temporal) realities, is open-ended for the absolute Difference. Thus Fundamental Philosophy can only be possible with the backdrop of metaphysics and hermeneutic: without metaphysics a philosophical contention might remain elusive, without hermeneutic a syntactic exercise in futility.

**GST 142 Communication in German 1 unit**

This course is meant as an introduction to German as a new foreign language for beginners. Through this course the student ought to be able to identify German optically in the written form and additively in the spoken form from all other languages. He or She is to be equipped to speak and express him or herself in German in the commonest circumstances of everyday life. Thus he or she is to be acquainted with basic situations for a simple dialogue, but must also be familiar with basic syntax and grammatical rules for further progress in the given language, especially for apprehension and appreciation of simple literary texts.

**GST 222: Peace and Conflict Resolution Studies (2 Units)**

This course focuses on the basic concept of peace and conflict resolution; peace as a vehicle of unity and development; conflict issues; types of conflicts e.g. ethnic/religious /political / economic conflicts; root causes of conflicts and violence in Africa; indigene / settler phenomenon; peace-building; management of conflicts and security; elements of peace studies and conflicts resolution; culture of peace mediation and peace-keeping, Alternative Dispute Resolution (ADR); dialogue and arbitration in conflict resolution; role of International Organization in conflict resolution e.g. economic community of west African States (ECOWAS); African union; united Nations; communal / indigenous conflicts; individual conflicts terrorism.

**GST 224: Fundamental Ethics (1 Unit)**

- i. The meaning of ethics
  - The goal of Ethics; The modesty of human conduct
  - Ethics and related disciplines
- ii. The subject matter of Ethics
  - The human act & the ‘act of man’
  - Enlightened Intellect
  - Deliberate will Freedom
- iii. Responsibility of human act
  - Modifiers of the human act; Determinants of value
- iv. The goal of human life
  - Major Ethical theories and the goal of human life
  - Utilitarianism
  - Pragmatism
  - Situationism
  - Existentialism
  - Etc
- v. Happiness of the good as the goal of human Life
  - Characteristics of the good
- vi. Road to Happiness:
  - Conscience
  - Truthfulness
  - Right and Duties

Natural virtues e.g Justice, temperance, fortitude, prudence and theological virtues, particular virtue (patience), chastity (easy virtue), peace.

### **GST 252: Bioethics (1 Unit)**

1. Meaning of Bioethics/ its nature, history and scope.
2. Meaning of ethics- general or meta-ethics, kinds of ethics.
3. Some bioethical principles and ethical terms-respect for autonomy, non-maleficence/efficiency, human respect and dignity. Bioethics and bio-medical ethics.
4. Issues/trends of abortion/euthanasia, suicide/ etc.
5. Artificial insemination/ reproduction and the “**Elele Gift**” scenario.
6. Human genetic modification/engineering, reproductive technologies/ human cloning; human fertilization and sterilization.
7. Embryonic stem cell research and therapy
8. HIV/AIDS, homosexuality/ lesbianism and bioethics
9. Bioethics and religious views (Catholic & Muslim)
10. Igbo/ Edeh’s concept of man and life and bioethical discourse; drug experimentation on human beings and bioethical/ bioecological/ waste management.

### **300 LEVEL**

#### **FIRST SEMESTER**

#### **OPT 301: General Optometry 1 (3Units)**

Introduction: Review of Ophthalmic Lenses and Prisms as related to Clinical Optometry. Classification and Correction of Refractive Errors.

Style, Scope and order of general optometric examination using trial lenses, phoropter etc.

- (a) Patient’s profile (children 0-17, adults 18 -40, presbyopes > 40)
- (b) Case history (routine, contact lens, low vision patients)
- (c) Preliminary tests begin in the following sequence.

#### Pre-ocular health assessments

- Focimetry if patient has a habitual correction with the lensometer or alternative(s).and/or

- Visual acuity tests at far and near. (Unaided, aided, pin hole) with acuity charts (Snellen / LogMAR).

- Interpupillary distance with p.d rule or alternatives. Ocular health assessment (with/ without drugs, or staining agents)

- (a) Anterior segment of the eye and its adnexa

Examination of the lid, conjunctiva, sclera and cornea with penlight, slit lamp biomicroscope and direct ophthalmoscope.

- (b) Equator

Examination of the Anterior chamber/angle with pen light/ slit lamp, direct ophthalmoscope, gonioscope gonioscopy, in all patient at risk for primary or secondary open or closed angle glaucomas solely for the purpose of identifying risk factors, and etiological differentiation and disease severity.

Examination of the - Anterior uvea / pupil with pen light slit lamp, direct ophthalmoscope

Examination of the Lens with pen light slit lamp, direct ophthalmoscope

**Lecture Plan: 2 hours of lectures/week**

Week 1/5: Review of Ophthalmic Lenses and Prisms. Classification and Correction of Refractive Errors. Style, Scope and order of general optometric examination using trial lens, phoropter etc.

Week 6/9: (a) Patient's profile (children 0-17, adults 18 -40, presbyopes > 40)

(b) Case history (routine, contact lens, low vision patients)

(c) Preliminary tests begin in the following sequence.

Pre-ocular health assessments.

Week 10/11: Focimetry if patient has a habitual correction with the lensometer or alternative(s).

Week 12/13: Visual acuity tests at far and near. (Unaided, aided, pin hole) with acuitychart. Inter-pupillary distance with pupillary distance (P.D) rule or alternatives.

Week 14: Revision

**OPT 311: Ophthalmic Optics I**

**(2 Units)**

Optical characteristics and design of standard ophthalmic single vision, bifocal, trifocal, progressive lenses and ophthalmic prisms. Emphasis will be placed on physical properties of lens materials including index of refraction, absorptive ability, lens coatings and special application of lens material to different occupations, low vision and sports. Characteristics of frame materials, design and selection. Lensometry. Lens neutralization cylindrical power and toric transpositions. Lens and frame specifications, IPD measurement, centration and decentration.

**Lecture Plan: 2 hours of lectures/week**

Week 1/3: Optical characteristics and design of standard ophthalmic single vision, bifocal, trifocal, progressive lenses and ophthalmic prisms.

Week 4/6: Physical properties of lens materials including index of refraction, absorptive ability, lens coatings and special application of lens material to different occupations, low vision and sports.

Week 7: Characteristics of frame materials, design and selection.

Week 8: Lensometry.

Week 9/11: Lens neutralization cylindrical power and toric transpositions. Lens and frame specifications.

Week 12/13: IPD measurement, centration and decentration.

Week 14: Revision.

**OPT 313: Physiological Optics I**

**(2 Units)**

A study of the dioptric functions of the visual apparatus consisting of lectures and demonstrations. The eye as an optical instrument, the schematic and reduced eyes. Dioptrics of the eye, optical constants, cardinal points, refractive power of the surfaces and media. Location and size of retinal images, visual angle and size of retinal

images. Amplitude of accommodation and presbyopia. Emmetropia, refractive status of the eye and optical aberrations. Badel, Optometer, Resolution and Visual Acuity.

**Lecture Plan:** 2 hours of lectures/week

Week 1/4: The eye as an optical instrument, the schematic and reduced eyes. Dioptrics of the eye, optical constants, cardinal points, refractive power of the surfaces and media.

Week 5/7: Location and size of retinal images, visual angle and size of retinal images.

Week 8/9: Amplitude of accommodation and presbyopia.

Week 10/11: Emmetropia, refractive status of the eye and optical aberrations.

Week 12/13: Badel Optometer, Resolution and Visual Acuity.

Week 14: Revision.

### **OPT 315: Dispensing Optics I**

**(2 Units)**

Bench work terminologies, Bench work stages – centering, layout, cutting, chipping and crumbling. Edging, drilling, mounting. Bench work assembling. Description and classification of glasses, frames, their specification and measurement. Preliminary adjustment (truing). Horizontal alignment of glasses, vertical alignment. Fitting, cosmetic factors, occupational factors and special considerations. Tinting of lenses. Introduction to contact lens fitting. Also filling and fitting of prism components.

**Lecture Plan:** 1 hour of lecture and 1 hour of practical/week.

Week 1/3: Bench work terminologies, Bench work stages – centering, layout, cutting, chipping and crumbling.

Week 4/6: Edging, drilling, mounting. Bench work assembling. Description and classification of glasses, frames, their specification and measurement.

Week 7/8: Preliminary adjustment (truing). Horizontal alignment of glasses, vertical alignment.

Week 9/10: Fitting, cosmetic factors, occupational factors and special considerations.

Week 11/12: Tinting of lenses. Introduction to contact lens fitting.

Week 13: Filling and fitting of prism components.

Week 14: Revision.

### **OPT 331: Ocular Anatomy**

**(2 Units)**

Detailed description of the gross structure of the visual apparatus. The orbit, its contents and related structure. Specific description of the anatomy of all parts; lids, cornea, sclera, choroids, iris, lens and retina, humour, lacrimal apparatus, the cranial nerves, extra-ocular muscles, as well as the process of vision and anatomy of the visual pathway. Practical sections on dissection using bovine eye.

**Lecture plan:** 2 hours of lectures/week

Week 1/2: Lids, cornea, sclera.

Week 3/4: Choroid, iris, lens.

Week 5/7: Retina.

Week 8: Humour, Lacrimal apparatus.

Week 9/11: The cranial nerves, extra-ocular muscles.

Week 12/13: The process of vision and visual pathway.

Week 14: Revision.

**OPT 335: Ocular Biochemistry (2Units)**

Introduction: biochemistry of the cell, cell membrane. Biochemistry of the tear film, aqueous humour, vitreous humour. Biochemistry of the cornea and crystalline lens with emphasis on the structure, metabolism and maintenance of transparency in these tissues. Biochemistry of the retina rods, and cones, ocular pigments, duplicity theory. Photochemistry of vision. Vitamin A metabolism and vision. Free radicals, reactive oxygen and nitrogen species (oxidants). Antioxidants. The role of free radicals in the pathophysiology of degenerative diseases.

**Lecture Plan:** 3 hours of lectures/week

Week 1: Biochemistry of the cell, cell membrane.

Week 2/3: Biochemistry of the tear film, aqueous humour, vitreous humour.

Week 4/6: Biochemistry of the cornea and crystalline lens with emphasis on the structure, metabolism and maintenance of transparency in these tissues.

Week 7/9: Biochemistry of the retina rods, and cones, ocular pigments, duplicity theory.

Week 10: Photochemistry of vision.

Week 11: Vitamin A metabolism and vision.

Week 12/13: Free radicals, reactive oxygen and nitrogen species (oxidants).

Antioxidants. The role of free radicals in the pathophysiology of degenerative diseases.

Week 14: Revision.

**PCO 321: General Pharmacology (3 Units)**

**Lecture Plan:** 3 hours of lectures/week

General Principles of Pharmacology: Pharmacodynamics, Pharmacokinetics, Autonomic nervous system: Principles and Classification of Autonomic Drugs. Drugs affecting the central nervous system; drug abuse (i) stimulants (ii) depressants (iii) analgesics (iv) antiepileptic drugs/sedatives/hypnotics (v) antipyretics (vi) tranquilizers. Muscle relaxants, Diuretic agents, Endocrine drugs-Anti-diabetics and thyroid drugs, Antidepressants. Drugs used to treat asthma. Oral contraceptives, Opioid analgesics. Introductory toxicology. Adverse effects of systemic drug therapy. Adverse effects of ocular drug therapy. Malaria chemotherapy, vitamins, metazoan.

Week 1/3: General Principles of Pharmacology, Principles and Classification of Autonomic Drugs.

Week 4/6: Drugs affecting the central nervous system; drug abuse (i) stimulants (ii) depressants (iii) analgesics (iv) sedatives (v) antipyretics (vi) tranquilizers.

Week 7: Muscle relaxants. Anti-diabetics. Oral contraceptives.

Week 8: Introductory toxicology.

Week 9/11: Adverse effects of systemic drug therapy. Adverse effects of ocular drug therapy.

Week 12/13: Malaria chemotherapy, vitamins, metazoan.

Week 14: Revision.

**ANT 335: Neuro Anatomy (3 Units)**



This course deals with the embryology, anatomy and functions of the central nervous systems, relationship with the eye, vision, neural connections of the eye and related structures; general neurology of the human. Specifically, the photoreceptor, visual pathway, Brodmann's classification of the brain and cranial nerves serving the eyes.

### **300 LEVEL**

#### **SECOND SEMESTER**

#### **OPT 302: General Optometry II (3 Units)**

(c) Posterior segment of the eye

Vitreous media with slit lamp, direct, indirect ophthalmoscopy.

Retina (the disc and its blood vessels; macula and its periphery) with slit lamp, direct, indirect ophthalmoscopy,

Visual pathway - the optic nerve, with indirect ophthalmoscopy/ tonometry (pre-dilatation intraocular pressure measurement is compulsory for all patients 40 and above, confrontation, Ishihara test.

(d) Post ocular health assessment (Binocular vision - unaided and/or aided with patient's habitual correction)

Cover tests (far and near) / jump vergence/ Maddox rod and wing

Near point of convergence

Motility test. / Hess screen (or alternative –prism cover test)

#### **Lecture Plan: 3 hours of lectures /week**

Week 1/3: Anterior segment of the eye and its adnexa

Examination of the - Lid with pen light, slit lamp, direct ophthalmoscope

Examination of the - Conjunctiva /sclera with pen light/ slit lamp, direct

Examination of the - Cornea with pen light/ slit lamp, direct Ophthalmoscope, keratometer.

Week 4/5: Examination of the anterior chamber/angle with pen light/ slit lamp, direct ophthalmoscope, gonioscope, gonioscopy, in all patient at risk for primary or secondary open or closed angle glaucoma solely for the purpose of identifying risk factors, and etiological differentiation and disease severity. Examination of the - Ant. Uvea / pupil with pen light slit lamp, direct ophthalmoscope. Examination of the crystalline lens with pen light slit lamp, direct ophthalmoscope

Week 6/9: Posterior segment of the eye

Vitreous media with slit lamp, direct, indirect ophthalmoscopy. Retina (the disc and its blood vessels; macula and its periphery) with slit lamp, direct, indirect ophthalmoscopy, Visual pathway - the optic nerve, with indirect ophthalmoscopy/ tonometry (pre-dilatation intraocular pressure measurement is compulsory for all patients 40 and above, confrontation, Ishihara test.

Week 10/13: Post ocular health assessment (Binocular vision - unaided and/or aided with patient's habitual correction)

Cover tests (far and near) / jump vergence/ Maddox rod and wing

Near point of convergence.

Motility test. / Hess screen (or alternative –prism cover test)

Week 14: Revision.

**OPT 310: Bacteriology and Immunology (2 Units)**

A. Parasitological Disease states, life cycles, transmission, pathogenic mechanism, symptoms, *etc.*

Diagnosis and immunity of infections by protozoan, trematodes, nematodes and anthropods

B. Mycology

Biology of fungi

Disease state, transmission, pathogenic mechanisms, symptoms, diagnosis and immunity of infections.

C. General immunology

Antigens (chemistry and origin)

Antigen – antibody interaction

Complement chemistry, function and pathways

Cytokines (origin and function)

Non – specific immunity

Specific immunity

Hypersensitivity

Transplantation immunology

Immunological tolerance

Autoimmunity.

**Lecture Plan:** 2 hours of lectures/week

Week 1/4: Parasitological Disease states, life cycles, transmission, pathogenic mechanism, symptoms, *etc.*

Diagnosis and immunity of infections by protozoan, trematodes, nematodes and anthropods.

Week 5/8: Mycology, Biology of fungi, Disease state, transmission, pathogenic mechanisms, symptoms, diagnosis and immunity of infections.

Week 9/13: General immunology, Antigens (chemistry and origin) Antigen – antibody interaction, Complement chemistry, function and pathways, Cytokines (origin and function), Non – specific immunity, Specific immunity, Hypersensitivity, Transplantation immunology, Immunological tolerance, Autoimmunity.

Week 14: Revision.

**OPT 312: Ophthalmic Optics II (2 Units)**

A continuation of OPT 311 with special emphasis on unique optical materials and their functions. It covers calculations and formulae to compute, mark and determine true power, lens thickness and the relationship of optical center to edge thickness. Base curve, flat and toric transpositions, lensometry.

Pre-requisite: OPT 311

**Lecture Plan:** 2 hours of lectures/week

Week 1/7: Calculations and formulae to compute, mark and determine true power, lens thickness and the relationship of optical center to edge thickness.

Week 8/10: Base curve, flat and toric transpositions.

Week 11/13: Lensometry

Week 14: Revision.

**OPT 314: Physiological Optics II (2 Units)**

Sensory aspect of visual perception, ocular motility and international systems. Normal and abnormal binocular vision heterophoria, heterotropia, measurements by dissociation and synoptophore instruments. The visual pathway, disturbance in the neural pathway and factors affecting it. Retina photoreceptors, photochemistry, retina neural connections and neurophysiology. Scotopic and photopic vision. Rhodopsin and its transformation. Rods and cones distinction. Retinal stimulation and resultant changes. Electrophysiology of vision – with emphasis on all the techniques applicable to the ocular tissues.

**Lecture plan:** 2 hours of lectures/week.

Week 1/3: Sensory aspect of visual perception, ocular motility and international systems.

Week 4/5: Normal and abnormal binocular vision heterophoria, heterotropia, measurements by dissociation and synoptophore instruments.

Week 6/7: The visual pathway, disturbance in the neural pathway and factors affecting it.

Week 8/9: Retina photoreceptors, photochemistry, retina neural connections and neurophysiology. Scotopic and photopic vision.

Week 10/11: Rhodopsin and its transformation. Rods and cones distinction. Retinal stimulation and resultant changes.

Week 12/13: Electrophysiology of vision – with emphasis on all the techniques applicable to the ocular tissues.

Week 14: Revision.

**OPT 316: Dispensing Optics Laboratory II (1 Unit)**

Laboratory cutting, work involves edging, glazing and fitting of lenses into frames. Tinting of lenses, usage of the different types of lensmeter, edgers etc.

**Lecture Plan:** 1 hour of lab/ week

Week 1/7: Laboratory cutting, work involves edging, glazing and fitting of lenses into frames.

Week 8/9: Tinting of lenses.

Week 10/13: Usage of the different types of lensmeter, edgers etc.

**OPT 336: Ocular Physiology (2 Units)**

A review of the description of the gross structure of the visual apparatus: the orbit, its contents and related structures. Specific description of the physiology of all parts: lids, cornea, choroids, iris, lens and retina, humour, lacrimal apparatus, the cranial nerves and extra-ocular muscles. Production and drainage of extra and intra ocular fluids. Intraocular pressure mechanism.

**Lecture Plan:** 2 hours of lecture/ week.

Week 1/3: Lids, cornea, sclera

Week 4/6: Choroid, iris, lens

Week 7/8: Retina

Week 9/10: Humour, lacrimal apparatus

Week 11/12: Cranial nerves, extra-ocular muscles

Week 13: Production and drainage of extra and intra ocular fluids. Intraocular pressure mechanism.

Week 14: Revision.

**OPT 362: Developmental Psychology (2 Units)**

Psychology in human growth and development. Distinction between development, growth and maturation. Influences of nature and nurture on development and in individual differences. Principles of development. Theories of development. Detailed treatment of stages, concepts, types and characteristics of human development. Disturbances in development.

**Lecture plan:** 2 hours of lecture/week

Week 1/4: Psychology in human growth and development. Distinction between development, growth and maturation.

Week 5/7: Influences of nature and nurture on development and in individual differences. Principles of development.

Week 8/12: Theories of development. Detailed treatment of stages, concepts, types and characteristics of human development.

Week 13: Disturbances in development.

Week 14: Revision.

**OPT 392: Biostatistics (2 Units)**

Principles of measurements. Sampling techniques, presentation of data in descriptive statistics. Frequency distribution. Measures of central tendency: mean, median, mode. Measures of dispersion: mean deviation, standard deviation, correlation and regression: scatter diagram, coefficient of correlation, rank correlation, lines of regression, probability: basic concepts related to probability theory, classical probability. Probability distributions: introduction and simple properties of binomial, Poisson and normal distributions and their applications in health science. Applications of descriptive, inferential, parametric and non-parametric statistics to health, theory of probability sampling techniques, hypothesis testing: critical region, students t-test for the significance of population mean and the difference between two population means; paired t-test; chi square test for population variance; goodness of fit and for the independence of two attributes in a contingency table, F-test for the equality of two population variance; analysis of variance (ANOVA): one way and two way analysis of variance. dealing with error, construction and interpretation of graphs and tables. Applications of biostatistics to health and medicine, drug counting; health survey.

**Lecture Plan:** 2 hours of lectures/ week

Week 1/4: Applications of descriptive, inferential, parametric and non-parametric statistics to health.

Week 5/8: Theory of probability sampling techniques, hypothesis testing, dealing with error.

Week 9/10: Construction and interpretation of graphs and tables.

Week 11/13: Applications of biostatistics to health and medicine, drug counting; health survey.

Week 14: Revision.

**PIO 334: Neurophysiology (2 Units)**

- A. Electrophysiology of the nerve cell  
Basis of resting potential (ionic balance, transport mechanisms)

Basis of action potential (ionic balances)

Action potential conduction

Synapses, classification, transmission.

Membrane physiology receptors, membrane channels

Inhibitory and excitatory postsynaptic potentials (including concepts of spatial and temporal summation.

B. Integration of nerve signals (synaptic processes, reflexes, feed backs, adaptation and habitation).

Sensory coding system (receptor potential uni-and multi-model units, receptive fields)

Somatosensory system (transmission of tactile, proprioceptive, temperature and pain sensations). Auditory system (function of middle ear and cochlea, central auditory mechanisms)

Vestibular system (function of vestibular apparatus, brainstem mechanisms of Vestibulo-ocular and postural reflexes).

Motor pathway (spinal reflex, muscle spindles, control of movement by the motor cortex, the cerebellum, the basal ganglia and brainstem structures).

Autonomic nervous system (including function of adrenal medulla and central regulation of visceral function).

Significance of evoked potentials CT and PET scanning and MRI colometer control.

Lateral geniculate physiology, striate and prostrate cortex

Visual input to parietals and temporal lobes

The limbic system and prefrontal cortex. Effects of cortical and tactual lesions and eye movement. Clinical implications of visual evoked potential (VER) and electro-retinogram (ERG).

## **400 LEVELS**

### **FIRST SEMESTER**

#### **OPT 401: Diagnostic Optometry 1 (Theory and Clinic) (3Units)**

Ophthalmoscopy

Refraction at

(a) Distance

(i) Objective: static retinoscopy, and/ or cycloplegic, and /or autorefraction.

(ii) Subjective: ophthalmic lens, and /or contact lens.

(iii) Binocular balancing.

(b) Near

(i) Dynamic retinoscopy or

(ii) Monocular and binocular Cross cylinder test

(c) Keratometry mandatory in contact lens work and optional as an aid to diagnosis, in some ocular pathologies.

(d) Binocular Vision Tests: Fusional reserves, Fixation disparity, Amplitude of accommodation and reading addition if patient is presbyopic. AC/A ratio.

Gross visual field screening

- Confrontation fields

- Central visual field screening (automated perimeter) for symptomless and risk- free patients.

Tonometry, Gonioscopy, Slit lamp biomicroscopy.

**Lecture Plan:** 2 hours of lectures/ week

Week 1/2: Interpupillary distance (for both far and near.)

Week 3/10: Refraction at

(a) Distance

- (i) Objective: static retinoscopy, and/ or cycloplegic, and /or autorefraction.
- (ii) Subjective: ophthalmic lens, and /or contact lens.
- (iii) Binocular balancing.

(b) Near

- (i) Dynamic retinoscopy or
- (ii) Monocular and binocular Cross cylinder test

Week 11/13: Keratometry mandatory in contact lens work and optional as an aid to diagnosis, in some ocular pathologies.

Week 14: Revision.

**OPT 403: Clinical Procedure & Practice I (Theory & Clinic) (3 Units)**

Techniques learnt in OPT 301, OPT 302, OPT 401 are practiced and developed preparatory to examining patients, using available equipment in the junior clinic. Coordinator demonstrates the clinical procedure used in patient examination

Which include the following Preliminary external tests continued. Clinical procedure and significance of the findings from penlight inspection, transillumination, papillary test, versions and vergence tests, far and near points of accommodation (PR&PP), RAF rule, placid disc. Munson sign, ocular palpation, confrontation visual field methods, Amsler grid, and colour vision tests: Ishihara / pseudoisochromatic plates, lantern test, farms worth D15 and 100 Hue tests; ophthalmoscope; Direct and monocular indirect. Class demonstration and exercise included.

**OPT 407: Optometric Instrumentation (2 Units)**

- (a) Description of the principles behind the operation of optometry ophthalmic instrumentation.
- (b) Principle of design, operation, basic maintenance and repair of common optometric instruments.
- (c) Advances in optometry instrumentation.

**Lecture Plan:** 2 hours of lecture/week.

Week 1/4: Description of the principles behind the operation of optometry ophthalmic instrumentation.

Week 5/9: Principle of operation, basic maintenance and repair of common optometric instruments.

Week 10/13: Advances in optometry instrumentation.

Week 14: Revision.

**OPT 413: Physiological Optics III (2Units)**

The photochemistry of vision. Sensory aspects of vision; color vision and adaptation. The mechanism of color vision defects, their detection and significance. Electrophysiology of the retina and visual pathway. Pullfrich phenomenon, post point, prism adaptation, Horopter, the cyclopean eye, Fixation disparity, Desk adaptation laboratory. Optical illusions, Holography, Entopic phenomenon.

**Lecture Plan:** 3 hours of lectures/week

Week 1/3: The photochemistry of vision. Sensory aspects of vision; color vision and adaptation.

Week 4/5: The mechanism of color vision defects, their detection and significance.

Week 6/7: Electrophysiology of the retina and visual pathway.

Week 8/10: Pullfrich phenomenon, post point, prism adaptation, Horopter, the cyclopean eye.

Week 11/13: Fixation disparity, Desk adaptation labs. Optical illusions, Holography, Entopic phenomenon.

Week 14: Revision.

**OPT 421: Contact Lens I (Theory) (2 Units)**

Physiology and Anatomy of Anterior Segment. Preliminary examination for Contact lens fitting like slit lamp biomicroscopy, keratometry, tear quality and tear quantity test etc. Introduction to contact lens, outlining the history and development of new materials, advantages and disadvantage of these materials including indications and contraindications to contact lens wear. Contact lens optics, designs, ordering, verification and modification, care of products and complications.

**Lecture Plan:** 2 hours of lectures/ week

Week 1/3: Introduction to contact lens, outlining the history and development of new materials, advantages and disadvantage of these materials including indications and contraindications to contact lens wear.

Week 4/9: Contact lens optics, designs, ordering, verification and modification.

Week 10/13: Care of products and complications.

Week 14: Revision.

**OPT 431: General Pathology (3 Units)**

Definition of pathology, disease and relevant terms used in pathology. The causes and classification of disease. Cell damage and its sequale. Inflammation, its functions and types. Cardinal signs and mechanisms of inflammation. Infection and the body's defence against it. Body's response to infection including immunity to infection. Cross infection and its control. Some important bacterial, fungal and viral infections including tuberculosis, candidiasis and HIV / AIDS.

Disorders of growth including hyperplasia, hypertrophy, dysplasia and dystrophy. Tumors, their etiologies, types, classification and characteristics. Cysts, their formation and classification. Developmental anomalies or disturbances. Effects of ionizing radiations on human tissues. Trauma- wounds, fractures, dislocations and bleeding. Systems pathology: Disorder of blood-disorders of red blood cells, WBC's and thrombocytes. Disorders of circulation. Disorders of the heart, diseases of the respiratory system, gastro-intestinal track and disorders of bones and joints.

**Lecture Plan:** 3 hours of lecture/week

Week 1/4: Definition of pathology, disease and relevant terms used in pathology. The causes and classification of disease .Cell damage and its sequale. Inflammation, its functions and types. Cardinal signs and mechanisms of inflammation.

Week 5/7: Infection and the body's defence against it. Body's response to infection including immunity to infection. Cross infection and its control. Some important bacterial, fungal and viral infections including tuberculosis, candidiasis and HIV / AIDS.

Week 8/10: Disorders of growth including hyperplasia, hypertrophy, dysplasia and dystrophy. Tumors, their etiologies, types, classification and characteristics. Cysts, their formation and classification. Developmental anomalies or disturbances. Effects of ionizing radiations on human tissues.

Week 10/13: Trauma- wounds, fractures, dislocations and bleeding. Systems pathology: Disorder of blood- disorders of red blood cells, WBC's and thrombocytes. Disorders of circulation. Disorders of the heart, diseases of the respiratory system, gastro-intestinal track and disorders of bones and joints.

Week 14: Revision.

### **OPT 437: Ocular Pharmacology and Toxicology (2 Units)**

Availability: sources of drugs, drug trends, types of drugs, etc.

Bio availability: Drug: Principles and routes of administration, concentration, forms, contact lens solutions, distribution, etc.The course explores the therapeutic mechanism of the major classes of ophthalmic medications, their side effects and first aid techniques for acute ophthalmic drug reactions. It would emphasize the relationship between ocular pathologies and their pharmacological management options, its indications and contraindications. It would deal with the general principles regarding application of ophthalmic drugs among the general and special populations such as pregnant women and children. It would also present the basic principles of drug toxicology such as teratology, phototoxic and photo allergic reactions.

**Lecture Plan:** 2 hours of lectures/week

Week 1/3: Availability: sources of drugs, drug trends, types of drugs, etc.

Week 5/10: Bio availability: Drug Gen, Principles, routes, concentration, forms, contact lens solutions, distribution, etc.

### **OPT 461: General Epidemiology (2 Units)**

Tenets of epidemiology. Descriptive epidemiology, Agent-Host- Environment model, person- Time-Place model, Analytical epidemiology, measurement of risks. Health status index, Health status indicators, incidence rate, prevalence rate, specific rates, screening, assessment of risk factors.

**Lecture Plan:** 2 hours of lectures/week

Week 1/4: Tenets of epidemiology. Descriptive epidemiology, Agent-Host- Environment model.

Week 5/8: Person- Time-Place model, Analytical epidemiology, measurement of risks.

Week 9/11: Health status index, Health status indicators, incidence rate, prevalence rate, specific rates.

Week 12/13: Screening, assessment of risk factors.

Week 14: Revision.

## **400 LEVEL**



## **SECOND SEMESTER**

### **OPT 402: Diagnostic Optometry II (Theory and Clinic) (3Units)**

Central visual field quantification (Where there are indications of field defect suggested by symptoms, signs, risk factors, quantification of threshold visual fields must be performed).

- Tangent screen test,
- Humphrey field analyzer (threshold automated perimeter is gold test).

Central vision assessment in the event of little or no reduction in visual acuity (central visual function assessment).

- Amslers chart. For centrocaecal scotomas and metamorphopsia.
- Contrast sensitivity and Disability glare
- Stereo acuity

The integration of individual findings. Visual analysis, graphical analysis, diagnosis, prognosis and therapy. Sphygmomanometry. General health and the influence of the various health conditions on the eyes. Optical coherence Tomography (OCT). Scanning laser polarimetry (GDX).

Subjective neuro diagnostic tests. Deceptive testing.

**Lecture Plan:** 2 hours of lectures/week

Week 1/3: Fusional reserves, Fixation disparity, Amplitude of accommodation and reading addition if patient is presbyopic. AC/A ratio.

Week 4/5: Gross visual field screening

- Confrontation fields
- Central visual field screening (automated perimeter) for symptomless and risk-free patients.

Week 6/7: Central visual field quantification (Where there are indications of field defect suggested by symptoms, signs, risk factors, quantification of threshold visual fields must be performed).

- Tangent screen test,
- Humphrey field analyser (threshold automated perimeter is gold test).

Week 8/9: Central vision assessment in the event of little or no reduction in visual acuity (central visual function assessment).

- Amslers chart. For centrocaecal scotomas and metamorphopsia.
- Contrast sensitivity and Disability glare
- Stereo acuity

Week 10/12: The integration of individual findings. Visual analysis, graphical analysis, diagnosis, prognosis and therapy. Sphygmomanometry.

Week 13: General health and the influence of the various health conditions on the eyes.

Week 14: Revision.

### **OPT 404: Clinical Procedure & Practice II (Theory and Clinic) (3 Units)**

Routine Optometric Examination: Review of Preliminary External Tests: Phorometry, Theory, Clinical Procedure and Result Interpretation In Indentation Tonometry, Perimetry, Slit-lamp Biomicroscopy, Applanation Tonometry (Including Goldman, NCT and Tonomat) Gonioscopy, Fundocopy, (Including Direct and Indirect Ophthalmoscopy).

**OPT 416: Clinical Dispensing of Ophthalmic Lenses (2 Units)**

Dispensing procedure physiological, physical and psychological accomplishments of an ophthalmic prescription.

Lens styling, absorptive and occupational glasses; significance and factors to be considered in fitting absorptive lenses. Metallic oxides used for tinting of absorptive lenses. The spectrum classification of glasses, special cases: lenticular lenses, coated lenses, transition lenses. Occupational analysis: factors to be considered with regards to the occupation bifocal prescription analysis. Prismatic effects in reading area of Bifocals, compensation. Trifocals and criteria for screening patients for bifocals, procedure for determining the segment height of multifocal lenses.

**Lecture Plan:** 2 hours of lectures/week.

Week 1/4: Lens styling, absorptive and occupational glasses; significance and factors to be considered in fitting absorptive lenses. Metallic oxides used for tinting of absorptive lenses.

Week 5/7: The spectrum classification of glasses, special cases: lenticular lenses, coated lenses, transition lenses.

Week 8: Occupational analysis: factors to be considered with regards to the occupation bifocal prescription analysis.

Week 9/10: Prismatic effects in reading area of Bifocals, compensation.

Week 11/13: Trifocals and criteria for screening patients for bifocals, procedure for determining the segment height of multifocal lenses. Week 14: Revision.

**OPT 422: Contact Lens II (Theory and Clinic) (2 Units)**

Contact Lens complications. Advanced contact lens practice and application to special cases like Astigmatism, keratoconus, presbyopia, aphakia, low vision and special uses of contact lenses. New technologies in contact lens production. Contact lens solutions. Principles behind design and production of contact lenses.

**Lecture plan:** 2 hours of lectures/week

Week 1/7: Advanced contact lens practice and application to special cases like Astigmatism, keratoconus, presbyopia, aphakia, low vision and special uses of contact lenses.

Week 8/11: New technologies in contact lens production. Contact lens solutions.

Week 12/13: Principles behind design and production of contact lenses.

Week 14: Revision.

**OPT 432: Ocular Pathology I (3 Units)**

General overview of the disease process with emphasis on the anterior segment, including congenital and acquired deformities: basic causes, symptoms and signs of pathology, prognosis, management and prevention

are covered. Diffuse disease and sequelae of the eye, diseases and abnormalities of the external eye (adnexa), conjunctiva, cornea, sclera, uveal tract, lens, vitreous, orbit, trauma and ocular emergencies.

**Lecture Plan: 3 hours of lectures / week**

Week 1/5: Conjunctiva, cornea, sclera

Week 6/9: Uveal tract, lens, vitreous.

Week 9/13: Orbit, Trauma and ocular emergencies.

Week 14: Revision.

**OPT 438: Ocular Pharmacology & Therapeutics (3 Units)**

Principles of Ocular Pharmacology. Autonomic control of the eye and autonomic ocular drugs. Choice and administration of diagnostic and prophylactic ophthalmic drugs: anti-infective preparations, antimicrobial drugs, anti-inflammatory drugs, local anesthetics, diagnostic drugs. Vascular endothelial growth factor (VEGF) and angiogenesis in eye disease. Drug treatment of common ocular conditions- antiglaucoma, anti-inflammatory: NSAIDs and steroids, antihistamine and mast cell stabilizers, antiviral and antifungal agents, antibiotics etc. Dry eyes and treatment. Diseases of the human ocular surface. Clinical usage of drugs: Drugs used in Ophthalmic Practice- Diagnostics and therapeutics: Anesthetics, Mydriatics, Miotics etc. Sterilization of instruments. Contact lens solutions. Abbreviations used for medications. Precautions and adverse effects from use of ophthalmic drugs. Introduction to toxicology.

**Lecture Plan: 3 hours of lectures/week.**

Week 1/2: Principles of ocular pharmacology. Choice and administration of diagnostic and prophylactic ophthalmic drugs

Week 3/5: Anti-infective preparations, Antimicrobial drugs. Anti-inflammatory drugs, local anesthetics

Week 6/9: Diagnostic drugs. Drug treatment of common ocular conditions-glaucoma, inflammatory conditions etc.

Week 10/12: Clinical usage of drugs: Drugs used in Ophthalmic Practice-Therapeutics, Diagnostics, Anesthetics, Mydriatics, Miotics etc. Sterilization of instruments. Contact lens solutions. Abbreviations used for medications.

Week 13: Precautions and adverse effects from use of ophthalmic drugs. Introduction to toxicology.

Week 14: Revision.

**OPT 452: Anomalies of Binocular vision (2 Units)**

Requisites for normal binocular vision. Anomalies of sensory and motor mechanisms. Incidence and classification of strabismus and amblyopia. Neurological basis for binocular vision. Causes of strabismus and amblyopia. Adaptive conditions commonly associated with strabismus. Clinical characteristics of eyes with amblyopia. Routine eye examination of strabismic patients and anisometropic amblyopia. Observation and recognition of clinical signs and techniques and skills for the testing of Monocular fixation, Amblyopia, Sensory fusion and stereopsis, Fixation disparity and Clinical work.

**Lecture Plan: 2 hours of lectures/week.**

Week 1/5: Requisites for normal binocular vision. Anomalies of sensory and motor mechanisms. Incidence and classification of strabismus and amblyopia. Neurological basis for binocular vision

Week 6/10: Causes of strabismus and amblyopia. Adaptive conditions commonly associated with strabismus. Clinical characteristics of eyes with amblyopia. Routine eye examination of strabismic patients and anisometropic amblyopia.

Week 11/13: Observation and recognition of clinical signs, techniques and skills for the testing of Monocular fixation, Amblyopia, Sensory fusion, stereopsis and Fixation disparity

Week 14: Clinical work and Revision

### **OPT462: Applied Psychology for Optometrists (2 Units)**

Introduction to psychology, and the application of the following concepts to optometry: motives and behaviour, motivation and perception, motivation and emotion, conditioning and learning, childhood development, personality, social perception, stress and stress disorders

**Lecture Plan:** 2 hours of lectures/week

Week 1/5: Introduction to psychology, and the application of the following concepts to optometry: motives and behaviour, motivation and perception, motivation and emotion.

Week 6/12: Conditioning and learning, childhood development, personality, social perception.

Week 13: Stress and stress disorders.

Week 14: Revision.

## **500 LEVEL**

### **FIRST SEMESTER**

#### **OPT 501: Clinical Procedure & Practice III (Clinic) (3 Units)**

Continuation of OPT 403 and 404. Techniques learnt in OPT 301, OPT 302, OPT 401 and OPT 402 are practiced and developed preparatory to examining patients.

Pre-requisites: OPT 403 and OPT 404

#### **OPT 503: Pediatric Optometry (Theory and Clinic) (2 Units)**

A review of the development of vision and the distribution of refractive errors among infants. Common congenital disorders, clinical assessment procedures for the young patient (from birth through elementary school), identification of learning disorders and recommendation of appropriate remedial programme.

**Clinical work:** Students should examine at least 5 pediatric patients.

**Lecture Plan:** 2 hours of lectures/ week.

Week 1/4: The development of vision and the distribution of refractive errors among infants.

Week 5/9: Common congenital disorders, clinical assessment procedures for the young patient (from birth through elementary school).

Week 10/13: Identification of learning disorders and recommendation of appropriate remedial programme.

Week 14: Revision.

#### **OPT 507: Visual Analysis (2 Units)**

**Description:** Visual analysis involves a thorough case study based on the various eye examination procedures that the clinician learned in the previous levels of the programme. Hypotheses are formulated as a result of the test findings that the clinician has performed on the patient. Continuation of visual analysis with emphasis on cases that need prismatic correction, age related visual problems, neurosis, and other problems that a patient would likely suffer from and how a clinician should handle such cases.

The didactic study in this course is applied in the clinic.

**Lecture Plan:** (3 hours of lectures / week)

Week1: Significance of patient care in the various aspects of taking the history and preliminary examination.

Week 2/4: Significance of visual tests.

- „ 5/6: Graphical analysis
- „ 7/8: Morgan's analysis
- „ 9: Mencias analysis
- „ 10: Discomforts emanating from visual disorders.
- „ 11: Guideline in modifying subjective findings
- „ 12: Problems Non-refractive in nature
- „ 13: Marlow's occlusion.
- „ 14: Review

**OPT 521: Contact Lens Clinic (2 Units)**

Techniques learnt in OPT 421 and 422 are practiced and developed preparatory to examining patients. This is purely a clinical course, therefore attending classes and dispensing contact lenses to at least 5 contact lens patients is expected at the end of the course.

**Lecture Plan: 2 hours of lectures/ week.**

Week 1/13: Fitting different types of contact lenses to contact lens patients

Week 14: Revision.

**OPT533: Ocular Pathology II (2 Units)**

Introduction to Pathophysiology, detection and management of posterior segment diseases / disorders of the retina, optic nerve, neural pathway and visual cortex. Ocular manifestation of systemic diseases, ocular emergencies. Student should be able to recognize and differentiate these diseases ophthalmoscopically and represent them in colored illustrations.

**Lecture Plan:** 2 hours of lecture/week.

Week 1/4: Retina.

Week 5/7: Optic nerve.

Week 8/9: Neural Pathway.

Week 10/11: Ocular manifestation of systemic and localized disease.

Week 12/13: Ocular emergencies.

Week 14: Revision.

**OPT 551: Orthoptics (2 Units)**

Definition, types of muscle imbalance, heterophorias. Application and use of various visual training and orthoptic devices and instruments. Different exercises, prisms, Remy separator, Maddox wing. Measurement of deviations.

**Lecture Plan:** 2 hours of lectures/ week.

Week 1/4: Definition, types of muscle imbalance, heterophorias.

Week 5/8: Application and use of various visual training and orthoptic devices and instruments.

Week 9/13: Different exercises, prisms, Remy separator, Maddox wing. Measurement of deviations.

Week 14: Revision.

**OPT 561: Environmental Vision (2 Units)**

Introduction: Man, his vision and his environment

Radiation and illumination protection against radiation and other hazards; Evaluation design of lighting; vision through the atmosphere; Problems of vision under water; Human factors in the solution to vision problems.

Occupational vision. Vision in sports. Vision in space and its relevance to research in vision

**Lecture Plan: 2 hours of lectures/week**

Week 1/2: Man, his vision and his environment.

Week 3/5: Radiation and illumination protection against radiation and other hazards; Evaluation design of lighting.

Week 6/7: Vision through the atmosphere; Problems of vision under water.

Week 8: Human factors in the solution to vision problems.

Week 9/12: Occupational vision. Vision in sports.

Week 13: Vision in space and its relevance to research in vision.

Week 14: Revision.

**OPT 563: Preventive Optometry (2 Units)**

The study of the principles and measures required for the preservation of health including general and specific nutritional environmental and social factors at home, school, industry and business predisposing vision anomalies or decreased visual efficiency. Prevention and control of diseases. The course emphasizes the role of the Optometrists in Public Health on such aspects as prevention of blindness, provision of optical devices to the visually impaired or blind and Industrial vision (Evaluation and Management).

**Lecture Plan:** 2 hours of lectures/week.

Week 1: At home.

Week 2/3: School.

Week 4/5: Industry and business predisposing vision anomalies or decreased visual efficiency. Prevention and control of diseases.

Week 6/8: Role of the optometrists in Public health on such aspects as prevention of blindness.

Week 9/12: Provision of optical aids to the blind and the near blind.

Week 13: Industrial vision.

Week 14: Revision.

**OPT 591: Scientific Research Methods (2 Units)**

Rudiments of research methodology and its application to the public health field. Course covers basic learning of the following aspects: research problem definition, research questions. Theoretical-conceptual formulation of research problems, review of related literature, basic research designs, methods of research observations, measurement of variable, data analytic techniques, interpretation of research findings. Includes study of randomization techniques, epidemiologic research designs and controlled clinical trials. Proposal writing.

**Lecture Plan:** 2 hours of lectures/week.

Week 1/3: Research problem definition, research questions, research and null hypothesis.

Week 4/6: Theoretical-conceptual formulation of research problems, review of related literature.

Week 7/9: Review of related literature, basic research designs.

Week 10/11: Methods of research observations, measurement of variable, data analytic techniques

Week 12/13: Interpretation of research findings. Includes study of randomization techniques, epidemiologic research designs and controlled clinical trials.

Week 14: Proposal writing. Revision.

**500 LEVEL**

**SECOND SEMESTER**

**OPT 500: Practice Management (2 Units)**

The various modes of practices; single (solo), partnership, group practice, employment practice in private practice, hospitals, government and industry. The development and management of optometric practice. Office location, layout, and the development of inert and professional relationships. Financing the optometric practice; initial purchase of equipment and stock; accounting procedures; investments. Limited liability companies. Introduction to legal systems – employment agreements, purchase agreements, legalizing of practice.

**Lecture Plan:** 2 hours of lectures/week.

Week 1/4: The various modes of practices; single, partnership, group practice, employed practice in hospitals, government and industry.

Week 5/7: The development and management of optometric practice.

Week 8/9: Office location, layout, and the development of inert and professional relationships.

Week 10/12: Financing the optometric practice; initial purchase of equipment and stock; accounting procedures; investments.

Week 13: Limited liability companies.

Week 14: Revision.

**OPT502: Clinical Procedure & Practice IV (Clinic) (3 Units)**

Practice of slit lamp examination, tonometry(contact and non-contact), direct and indirect ophthalmoscopy, autorefraction and keratometry, manual keratometry, visual field testing using tangent screen, Amsler grid chart,

Humphrey visual field analyzer, Frequency Doubling Technology, use of low vision kit, synotophore, Remy separator, lensometry and use of fundus camera in patients.

Prerequisite : OPT 501

**OPT 504: Geriatric Optometry (2 Units)**

Defining the geriatric patient. Psychological, physiology, social and ocular problems of the elderly. Techniques for refraction, binocularity and ocular health assessment for the elderly with emphasis on involution and pathological changes. Special oculo-visual problems of concern to the elderly patient.

Presbyopia, cataract, aphakia, age-related macular degeneration, visual field losses, low contrast sensitivity and color vision. Age-related illumination needs. Handling and counseling the elderly patient. Problems of therapy, management and compliance. Special problems of the hospitalized and bedridden elderly patients. Clinical work is included.

**Lecture Plan: 2 hours of lecture/week.**

Week 1/2: Defining the geriatric patient. Psychological, physiology, social and ocular problems of the elderly.

Week 3/5: Techniques for refraction, binocularity and ocular health assessment for the elderly with emphasis on involution and pathological changes.

Week 6: Special oculo-visual problems of concern to the elderly patient.

Week 7/10: Presbyopia, cataract, aphakia, visual field losses, low contrast sensitivity and color vision.

Week 11/13: Handling and counseling the elderly patient. Problems of therapy, management and compliance. Special problems of the hospitalized and bedridden elderly patients.

Week 14: Revision.

**OPT 534: Ocular Pathology III (2 Units)**

Papillary and accommodative anomalies in neurological diseases. Headaches, Migraines and other photopic episodes. Optic nerve disorders, supranuclear and infranuclear Oculomotor presentations, nystagmus. Visual field disorders and the study of different instruments for field charting.

**Lecture Plan: 2 hours of lectures/week**

Week 1/3: Papillary and accommodative anomalies in neurological diseases.

Week 4/6: Headaches, Migraines and other photopic episodes.

Week 5/9: Optic nerve disorders, supranuclear nuclear and infranuclear oculomoter presentations, nystagmus.

Week 10/13: Associated visual field disorders and the study of different instruments for field charting.

Week 14: Revision.

**OPT 542: Low Vision and Ocular Prostheses (2 Units)**

This course is designed to familiarize the student with a wide range of definitions and epidemiology of low vision and blindness. Associated functional losses, psychological and sociological factors. Low vision examination and diagnosis; principles and calculation of magnification; optical and non-optical devices; optics of low vision devices; prescribing assistive devices; illumination controls; options for visual field enhancement; bioptic telescopes; building designs for the partially sighted and blind. Ocular prostheses: evaluation and fitting.



**Lecture plan:** 2 hours of lecture/ week.

Week 1-4: Definitions, classifications, epidemiology implications of low vision

Week 4-8: Low vision examination, diagnosis, magnifications, optical and non-optical devices

Week 9-11: Visual field enhancement, bioptics and building designs

Week 12-13: Ocular prostheses: evaluation and fitting.

Week 14: Revision.

**OPT 564: Medical Laws, Ethics & Jurisprudence (2 Units)**

Code of ethics and rules of professional conduct. Inter-professional relationships, professional associations and legal aspects of practicing Optometry in Nigeria.

**Lecture Plan: 2 hours of lectures/week.**

Week 1/6: Code of ethics and rules of professional conduct.

Week 7/13: Inter-professional relationships, professional associations and legal aspects of practicing Optometry in Nigeria.

Week 14: Revision.

**OPT 566: Endocrinology and Nutrition (2 Units)**

This course will cover basic human endocrine systems and general functions, mode of action, regulation and transport. Vitamins and their metabolism effect of vitamins in the eye. Metabolic disturbances related to dietary deficiencies such as xerophthalmia, vitamin a deficiency, galactose cataract, diabetic mellitus, optic neuritis etc. metabolic diseases and their ocular manifestations.

**Lecture Plan: 2 hours of lectures/ week**

Week 1/5: Basic human endocrine systems and general functions, mode of action, regulation and transport.

Week 6/10: Vitamins and their metabolism effect of vitamins in the eye. Metabolic disturbances related to dietary deficiencies such as xerophthalmia, Vitamin A deficiency, galactose cataract, diabetic mellitus, optic neuritis etc.

Week 11/13: Metabolic diseases and their ocular manifestations.

Week 14: Revision.

**600 LEVEL**

**FIRST SEMESTER**

**OPT 605: Clinical Posting (Externship)/ Report (9Units)**

At the end of five hundred level, students who have passed all their courses go on clinical posting in clinics outside the University, but within the country. Optometric patient care are provided in interdisciplinary and non-interdisciplinary health care setting (external to the University) by students under strict supervision. This course starts from 500 Level long vacation and ends before Easter. Patients should be seen in all the listed specialties in optometry: Vision rehabilitation, contact lens, pediatrics, geriatrics, orthoptics and Binocular vision and pathology.

**OPT 671: Seminar on Externship (3 Units)**

Students make power point presentation to staff members on cases that they see during the externship period. This is a form of externship defense.

**OPT 673: Seminar on current eye and vision research topics (3 Units)**

Recent developments in Optometry are presented. Review of current literature, critical views on the latest diagnostic and therapeutic techniques are discussed in different field of recent on the eye care delivery system.

**Lecture plan:**

The course involves Power point Presentations on the above mentioned by each student at the end of which questions will be asked and evaluation will be done based on the presentation, quality of work, comporment and ability to answer questions asked.

**600 LEVEL**

**SECOND SEMESTER (2<sup>ND</sup>)**

**OPT 602: Primary Eye Care (6 Units)**

Examination, diagnosis and management of patients in the optometry clinic under the supervision of an optometrist. Emphasis is placed on the routine optometric examination and the detection of pathology. Practice with emphasis on total scope of optometric patient care; including general care of children, adults and geriatric population; diagnosis of ocular disease; contact lenses; visual training and dispensing.

**Clinical plan:**

The course is purely clinical. Students are expected to examine and manage the number of patients indicated in the different areas/ specialties of optometry as listed below by the end of the course,

Refractive: 30

Pathology: 10

Low vision: 5

Contact lens: 10

Orthoptics: 10

Pediatrics: 5

Geriatrics: 10

**OPT 604: Hospital Practice (2 Units)**

This involves attending to patients within health care setting external to the University: Hospitals, Health Centers and Ambulatory care services. Inter-disciplinary practice. Course involves; hospital administration, inter relationship between the optometrist and other consultants in a hospital setting. Different categories of referral, functions of an optometrist in a hospital setting. Optometric/ health ethics.

**Lecture Plan: 2 hours of lectures/week**

Week 1/3: Hospital administration.

Week 4/5: Inter relationship between the optometrist and other consultants in a hospital setting.

Week 6/9: Different categories of referral, functions of an optometrist in a hospital setting.

Week 10/13: Optometric/ health ethics.

Week 14: Revision.

**OPT 606: Community Eye Health (2 Units)**

Students participate in Outreach programmes involving off campus sites under supervision of Optometrists. Students embark on vision screening, field trips to rural communities to deliver eye care services and survey of endemic eye and vision problems. Students will prepare a report, which will be submitted to the department on cases and experience acquired from the programme. Description of global, regional, and national blindness: application of epidemiological data, strategies for the prevention and control of the major causes of avoidable blindness, identify human resources needs, ability to deliver training courses, knowledge of the infrastructure and technology requirements, principals of health education, policy and planning, and principles of health economics.

**Lecture plan:** 2 hours of lecture and 1hour of outreach/week.

Week 1/3: description of global, regional, and national blindness, outreach/field work

Week4/6: application of epidemiological data, strategies for the prevention and control of the major causes of avoidable blindness, outreach/field work

Week7/9: identify human resources needs, ability to deliver training courses, knowledge of the infrastructure and technology requirements, outreach/field work

Week 10/12: principals of health education, policy and planning, and principles of health economics.

Week 13/14: outreach/field work and revision

**OPT 634: Advances in Optometry (2 Units)**

Recent developments in optometry, especially in research, instrumentation and the entire profession of optometry, also, regarding new legal pronouncement in optometry. The future of the profession of optometry-Eye physicians and surgeons.

**Lecture Plan: 2 hours of lectures/week.**

Week 1/6: Recent developments in optometry especially in research, instrumentation and the entire profession of optometry.

Week 7/8: New legal pronouncement in optometry.

Week 9/13: The future of the profession of optometry-Eye physicians and surgeons.

Week 14: Revision.

**OPT 692: Research Project (6 Units)**

Areas of research emphasis to be discussed with the faculty. Each student is to undertake an investigation / research in the selected and approved area for the purpose of discovering, exposing new facts of throwing more

light on existing facts. Oral defense before an informed panel to be appointed by the head of the department and the membership should include an external examiner for the course.

Pre-requisite: OPT 591 Scientific research methods

**Work plan:**

Week 1/3: Proposal writing and oral proposal defense

Week 4/6: Data collection and analysis

Week 7/12 Dissertation writing

Week 13: Oral Dissertation (Internal) defense

Week 14: External Examiners defense.