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CURRICULUM
B.Sc Optometry
SPIRITUAL PRINCIPLES IN EDUCATION

“In the gurukulas of ancient rishis, when the master spoke it was love that spoke; and at the receiving end disciple absorbed of nothing but love. Because of their love for their Master, the disciples’ hearts were like a fertile field, ready to receive the knowledge imparted by the Master. Love given and love received. Love made them open to each other. True giving and receiving take place where love is present. Real listening and ‘sraddha’ is possible only where there is love, otherwise the listener will be closed. If you are closed you will be easily dominated by anger and resentment, and nothing can enter into you”.

“Satguru Mata Amritanandamayi Devi”
Introducing AIMS

India is the second most populous nation on earth. This means that India’s health problems are the world’s health problems. And by the numbers, these problems are staggering: 41 million cases of diabetes, nearly half the world’s blind population, and 60% of the world’s incidences of heart disease. But behind the numbers are human beings, and we believe that every human being has a right to high-quality healthcare.

Since opening its doors in 1998, AIMS, our 1,200 bed tertiary care hospital in Kochi, Kerala, has provided more than 4 billion rupees worth of charitable medical care; more than 3 million patients received completely free treatment. AIMS offers sophisticated and compassionate care in a serene and beautiful atmosphere, and is recognized as one of the premier hospitals in South Asia. Our commitment to serving the poor has attracted a dedicated team of highly qualified medical professionals from around the world.

The Amrita Institute of Medical Sciences is the adjunct to the term “New Universalism” coined by the World Health Organization. This massive healthcare infrastructure with over 3,330,000 sq. ft. of built-up area spread over 125 acres of land, supports a daily patient volume of about 3000 outpatients with 95 percent inpatient occupancy. Annual patient turnover touches an incredible figure of almost 800,000 outpatients and nearly 50,000 inpatients. There are 12 super specialty departments, 45 other departments, 4500 support staff and 670 faculty members.

With extensive facilities comprising 28 modern operating theatres, 230 equipped intensive-care beds, a fully computerized and networked Hospital Information System (HIS), a fully digital radiology department, 17 NABL accredited clinical laboratories and a 24/7 telemedicine service, AIMS offers a total and comprehensive healthcare solution comparable to the best hospitals in the world. The AIMS team comprises physicians, surgeons and other healthcare professionals of the highest caliber and experience.

AIMS features one of the most advanced hospital computer networks in India. The network supports more than 2000 computers and has computerized nearly every aspect of patient care including all patient information, lab testing and radiological imaging. A PET (Positron Emitting Tomography) CT scanner, the first of its kind in the state of Kerala and which is extremely useful for early detection of cancer, has been installed in AIMS and was inaugurated in July 2009 by Dr. A. P. J. Abdul Kalam, former President of India. The most recent addition is a 3 Tesla Silent MRI.

The educational institutions of Amrita Vishwa Vidya Peetham, a University established under section 3 of UGC Act 1956, has at its Health Sciences Campus in Kochi, the Amrita School of Medicine, the Amrita Centre for Nanosciences, the Amrita School of Dentistry, the Amrita College of Nursing, and the Amrita School of Pharmacy, committed to being centres of excellence providing value-based medical education, where the highest human qualities of compassion, dedication, purity and service are instilled in the youth. Amrita School of Ayurveda is located at Amritapuri, in the district of Kollam. Amrita University strives to help all students attain the competence and character to humbly serve humanity in accordance with the highest principles and standards of the healthcare profession.
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Part I
Rules and Regulations
## Under Graduate Programmes (Bachelor of Sciences)

### I.1. Details of Under Graduate Courses:

<table>
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<tr>
<th>Sl. No.</th>
<th>Course</th>
<th>Duration</th>
<th>Conditions of Eligibility for admission to the course</th>
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<tbody>
<tr>
<td>1</td>
<td>Medical Laboratory Technology (MLT)</td>
<td>4 years</td>
<td>Pass in plus Two with 50% marks with Physics, chemistry and Biology</td>
</tr>
<tr>
<td>2</td>
<td>Medical Radiologic Technology (MRT)</td>
<td>4 Years</td>
<td>First class in plus two with Mathematics, Physics, Chemistry, and Biology</td>
</tr>
<tr>
<td>3</td>
<td>Emergency Medical Technology</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>4</td>
<td>Anaesthesia Technology</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>5</td>
<td>Respiratory Therapy (RT)</td>
<td>3 Years + One year Internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>6</td>
<td>Dialysis Therapy</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>7</td>
<td>Physician Assistant</td>
<td>3 years + one year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>8</td>
<td>Cardio Vascular Technology (CVT)</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>9</td>
<td>Echocardiography Technology</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>10</td>
<td>Cardiac Perfusion Technology (CPT)</td>
<td>3 Years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>11</td>
<td>Diabetes Sciences</td>
<td>3 years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>12</td>
<td>Optometry</td>
<td>3 Years + One year Internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>13</td>
<td>Bachelor of Audiology &amp; Speech Language Pathology (BASLP)</td>
<td>3 years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>14</td>
<td>Neuroelectro-physiology</td>
<td>3 years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>15</td>
<td>Operation Theatre Technology</td>
<td>3 years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
</tr>
<tr>
<td>16</td>
<td>Intensive Care Technology</td>
<td>3 years + One year internship</td>
<td>Pass in plus two with 50% marks in Physics, Chemistry and Biology</td>
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</table>
I.2. Medium of Instruction:
English shall be the medium of instruction for all subjects of study and for examinations.

I.3. Eligibility:
Generally Science Graduates with Physics, Chemistry, and Biology are eligible for admission to the Under Graduate Courses except in respect of certain specialties for which other qualification or subjects are specifically called for. Essential qualifications for eligibility are mentioned under clause I.1

II. General Rules:
Admissions to the courses will be governed by the conditions laid down by the University from time to time and as published in the Regulations for admissions each year.

II.1. Duration of the Course
Duration details are mentioned under clause No.I of this booklet.

<table>
<thead>
<tr>
<th>Duration of the course</th>
<th>: 4 Years (3 years + 1 year Internship except for courses at serial number 1 and 2 in clause I.1)</th>
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<tr>
<td>Weeks available per year</td>
<td>: 52 weeks</td>
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<tr>
<td>Vacation / holidays</td>
<td>: 5 weeks (2 weeks vacation + 3 weeks calendar holidays)</td>
</tr>
<tr>
<td>Examination (including preparatory)</td>
<td>: 6 weeks</td>
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<tr>
<td>Extra curricular activities</td>
<td>: 2 weeks</td>
</tr>
<tr>
<td>Weeks available</td>
<td>: 39 weeks</td>
</tr>
<tr>
<td>Hours per week</td>
<td>: 40 hours</td>
</tr>
<tr>
<td>Hours available per academic year</td>
<td>: 1560 (39 weeks x 40 hours)</td>
</tr>
</tbody>
</table>

Internship wherever specified are integral part of the course and needs to be done in Amrita Institute of Medical Sciences, Kochi itself.

II.2. Discontinuation of studies
Rules for discontinuation of studies during the course period will be those decided by the Chairman/Admissions, Amrita School of Medicine, and Published in the “Rules and Regulations” every year.

II.3. Educational Methodology
Learning occurs by attending didactic lectures, as part of regular work, from coworkers and senior faculty, through training offered in the workplace, through read-
ing or other forms of self-study, using materials available through work, using materi-
als obtained through a professional association or union, using materials obtained
on students own initiative, during working hours at no cost to the student.

II.4. Academic Calendar

Course will follow and annual scheme as per details mentioned under:

FIRST YEAR

Commencement of classes – August 2019
First sessional exam – November 2019
Second sessional exam – February 2020
Model Exam (with practical) – May - June 2020 (10 days study leave)
University exam (with practical) – June - July 2020 (10 days study leave)
Annual Vacation – 3 weeks after the University examination.

SECOND YEAR

Commencement of classes – August 2020
Sessional exam – January 2021
Model Exam (with practical) – May - June 2021 (10 days study leave)
University exam (with practical) – June - July 2021 (10 days study leave)
Annual Vacation – 2 weeks after the University examination

THIRD YEAR

Commencement of classes – August 2021
Sessional exam – January 2022
Model Exam (with practical) – May 2022 (10 days study leave)
University exam (with practical) – June 2022 (10 days study leave)
Annual Vacation – 1 week after the University examination.
Date of completion of third academic year – 31st July 2022

INTERNSHIP

Commencement of internship – 01 August 2022
Completion of internship – 31 July 2023
III. Examination Regulations:

III.1. Attendance:

75% of attendance (physical presence) is mandatory. Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the final examination in each subject.

III.2. Internal Assessment:

For the first year at least three sessional examinations in theory and preferably one practical examination shall be conducted in each subject. The following second/third year shall have one sessional and one model examination.

1. The period for sessional examinations of first academic year are as follows:

   First Sessional Exam : November
   Second Sessional Exam : February
   Model Exam : May /June

2. The period for sessional examinations of second/third academic year are as follows:

   Sessional Exam : November/December
   Model Exam : May /June

3. The last internal assessment examination will be the model examination which shall follow the pattern of the University Examination. Average of the best of two examinations and the marks obtained in assignments/viva/practical also shall be taken to calculate the internal assessment.

4. A candidate should secure a minimum of 50% marks in the internal assessment in each subject (separately in theory and practical) to be eligible to appear for the University examination.

5. Each student should maintain a logbook and record the procedures they do and the work patterns they are undergoing. It shall be based on periodical assessment, evaluation of student assignment, preparation for seminar, clinical case presentation, assessment of candidate’s performance in the sessional examinations, routine clinical works, logbook and record keeping etc.
6. Day to day assessment will be given importance during internal assessment and weightage for internal assessment shall be 20% of the total marks in each subject.

7. Third sessional examinations (model exam) shall be held three to four weeks prior to the University Examination and the report shall be made available to the Principal ten days prior to the commencement of the university examination.

III.3. University Examinations:

3. University Examination shall be conducted at the end of every academic year. A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.

4. One academic year will be twelve months including the days of the University Examination. Year will be counted from the date of commencement of classes which will include the inauguration day.

5. The minimum pass marks for internal assessment is 50% and for the University Examination is 50%. The student should score a total of 50% (adding the internal and external examination) to pass in each subject (separately for theory and practical)

6. If a candidate fails in either theory or practical paper, he/she has to reappear for both the papers (theory and practical)

7. Maximum number of attempts permitted for each paper is five (5) including the first attempt.

8. The maximum period to complete the course shall not exceed 6 years.

9. All practical examinations will be conducted in the respective clinical areas.

10. Number of candidates for practical examination should be maximum 12 to 15 per day

11. One internal and external examiner will jointly conduct the theory evaluation and practical examination for each student during the final year.

III.4. Eligibility to appear university Examination:

A student who has secured 50% marks for Internal Assessment is qualified to appear for University Examination provided he/she satisfies percentage of attendance requirement as already mentioned at the III (1).

III.5. Valuation of Theory – Revaluation Papers:

1. Valuation work will be undertaken by the examiners in the premises of the Examination Control Division in the Health Sciences Campus.
2. There will be **Re-Valuation** for all the University Examinations. Fees for revaluation will be decided by the Principal from time to time.

3. Application for revaluation should be submitted within ten (10) days from date of result of examination declared and it should be submitted to the office with payment of fees as decided by the Principal.

### III.6. Supplementary Examinations:

Every main University Examination will be followed by a supplementary examination which will normally be held within four to six months from the date of completion of the regular examination.

As stipulated under clause No. III.2 under Internal Assessment, HOD will hold an internal examination three to four weeks prior to the date of the University Examination. Marks secured in the said examination or the ones secured in the internal examination held prior to the earlier University Examination whichever is more only will be taken for the purpose of internal assessment. HODs will send such details to the Principal ten days prior to the date of commencement of University Examination.

Same attendance and internal marks of the regular examination will be considered for the supplementary examination, unless the HOD furnishes fresh internal marks and attendance after conducting fresh examination.

Students who have not passed / cleared any subjects in the first University examination will be permitted to attend the second year classes and also eligible to appear for second year university examination along with first year supplementary examination. However, he / she can appear for the third (final) year university examination, only if he / she clear all the subjects in the first as well as in the second year examinations.

Students of supplementary batches are expected to prepare themselves for the University Examinations. No extra coaching is expected to be provided by the Institution. In case at any time the Institution has to provide extra coaching, students will be required to pay fees as fixed by the Principal for the said coaching.

### III.7. Rules regarding carryover subjects:

A candidate will not be permitted to continue the second and third year respectively of the course if he/she has failed in more than 3 subjects in the first or second year university examinations.

A candidate must have passed in all subjects to become eligible to undergo compulsory internship of one year. For the candidates who have not passed all the subjects the duration of the third year shall be extended until they become eligible to undergo compulsory internship.
IV. Criteria for Pass in University Examination - Regulations:

IV.1. Eligibility criteria for pass in University Examination:

In each of the subjects, a candidate must obtain 50% in aggregate for a pass and the details are as follows:

3. A separate minimum of 50% for Internal Assessment.
4. 50% in Theory & 50% in Viva.
5. A separate minimum of 50% in aggregate for Practicals / Clinics (University Examinations).
6. Overall 50% is the minimum pass in subject aggregate (University Theory + Viva + Practicals + Internal Assessment).

IV.2. Evaluation and Grade:

1. Minimum mark for pass shall be 50% in each of the theory and practical papers separately (including internal assessment) in all subjects except English.
2. A candidate who passes the examination in all subjects with an aggregate of 50% marks and above but less than 65% shall be declared to have passed the examination in the second class.
3. A candidate who passes the examination in all subjects in the first attempt obtaining not less than 65% of the aggregate marks for all the three years shall be declared to have passed the examination with First Class.
4. A candidate who secures an aggregate of 75% or above marks is awarded distinction. A candidate who secures not less than 75% marks in any subject will be deemed to have passed the subject with distinction in that subject provided he / she passes the whole examination in the first attempt.
5. A candidate who takes more than one attempt in any subject and pass subsequently shall be ranked only in pass class.
6. A Candidate passing the entire course is placed in Second class / First class / Distinction based on the cumulative percentage of the aggregate marks of all the subjects in the I, II and III (Final) university examinations.
7. Rank in the examination: - Aggregate marks of all three year regular examinations will be considered for awarding rank for the B.Sc Graduate Examination.

V. Internship:

V.1. Eligibility for Internship - Regulations:

Wherever internship is a part of the curriculum, students will have to do the internship in Amrita Institute of Medical Sciences itself. A candidate must have passed in all subjects to become eligible to undergo compulsory internship of one year or a period fixed in the curriculum.
“Internship has to be done continuously for a period provided in the syllabus except in extra ordinary circumstances where subject to the approval of the Principal the same may be done in not more than two parts with an interruption not exceeding six months. In any case Internship shall be completed within 18 months from the date of acquiring eligibility to do the internship.

The students will be posted in Amrita Institute of Medical Sciences, Kochi and Amrita Institute of Medical Sciences, Faridabad, if necessary, during final year and internship period.

V.2. Attendance and leave details during Internship:

For 30 days of duty an intern will be eligible for casual leave and one weekly off. A Student will become eligible to receive his/her degree only after completion of internship to the complete satisfaction of the Principal.

VI. General considerations and teaching / learning approach:

There must be enough opportunities to be provided for self learning. The methods and techniques that would ensure this must become a part of teaching-learning process.

Proper records of the work should be maintained which will form the basis for the student’s assessment and should be available to any agency who is required to do statutory inspection of the school of the course.

VII. Project:

Each student should submit a project in consultation with HOD and guidance under Project Guide, 3 months prior to their final year University Exam. The student will be eligible to appear for the final year examination only after submission of the project.

VIII. Maintenance of Log Book

- Every graduate student shall maintain a record of skills he/she has acquired during the training period certified by the various Heads of Departments/Program Coordinator under whom he/she has undergone training.
- In addition, the Head of the Department shall involve their graduate students in Seminars, Journal Club, Group Discussions and participation in Clinical, Clinical-Pathological meetings.
- The Head of the Departments/Program coordinator shall scrutinize the log-book in every month.
- At the end of the course, the student should summarize the contents and get the log book certified by the Head of the Department.

The log book should be submitted at the time of practical examination for the scrutiny of the Board of Examiners.
Part II
Syllabus
INTRODUCTION AND ADVANCEMENT

Optometry is an independent Vision care science, that is autonomous, educated and regulated (licensed/registered), which covers the examination of human eyes and visual systems which includes rehabilitation of condition of the visual systems and required for estimation of errors of refraction, the fitting, manufacturing and supply of optical aids.

An Optometrist is a primary health care professional who is institutionally educated and clinically trained in science of Optometry. Professional education in Optometry is necessary to efficiently manage any optical trade including dispensing of spectacles.

The purpose of this programme is to develop a multipurpose ophthalmic manpower at paramedical level. The training will enable a student to become a competent person in providing service as an Optician, Optometrist, Refractionist and Ophthalmic Assistant to the community in urban, semi-urban and rural settings in private, semi-governmental and governmental sectors. The trainee on the completion of the programme, besides functioning primarily as an Optometrist and Refractionist, would also perform various tasks at all levels. The main objectives of the programme are to:

1. Prepare the students to assist eye specialists in big eye hospitals, eye care health units, etc. as Optometrists, Theater Assistants and Refractionists.
2. Enable the students to get themselves self employed as Opticians, Optometrists, and Refractionists.
3. Enable the students to estimate errors of refraction and be able to prescribe glasses.
4. Enable the students to maintain ophthalmic appliances and instruments; and
5. Enable the students to assess ocular motility disorders and prescribe adequate treatment including eyeball exercises.

Scope and Career Options

- Assist ophthalmologists in hospital clinic
- Practice in optical establishments
- Run optical shop
- Have excellent job opportunities overseas.
- Offer clinical services to multinationals dealing with the manufacturing and distribution of ophthalmic lenses, contact lenses and ophthalmic instruments.
- Start manufacturing unit for optical lenses.
- For those interested in higher studies Graduation / Post Graduation in the form of fellowships, M.Sc and PhD programs are available.
- Take up teaching Optometry as a carrier
MAIN OBJECTIVES OF THE COURSE

Basic Medical Sciences

1. To achieve general understanding of the Human Biology (Anatomy, Physiology, and Biochemistry).
2. To achieve good understanding of the basic medical sciences as related to Ophthalmology (Anatomy, Physiology, Optics, Pharmacology and Microbiology).

Clinical

The objective of the clinical works is to enable a student to work under the supervision of an Ophthalmologist so as to render assistance, develop skills and to perform other optometric jobs.

1. Be able to develop skills to carry out Ophthalmic Investigations.
2. Be able to do refraction work including prescription of glasses, contact lenses, low vision aids.
3. Be able to assess disorder of Ocular motility and unioocular and binocular visual functions and knowledge of principles of non-surgical therapy and indications of surgery.
4. To impart knowledge with regard to common eye diseases with a view to acquaint them in their recognition.
5. To impart training to develop skill in manufacturing of spectacle lenses and contact lenses.
6. To impart knowledge regarding organizations of eye banks and preservation of ocular tissues.
7. To impart knowledge regarding importance and the methodology of conducting surveys for early detection of visual defects, prevalence of ocular diseases and organization of community services like eye camps, schools, clinics and community eye care programme.
8. To impart knowledge regarding the programme of blindness, its causes and principles of rehabilitation of the blind.
COURSE STRUCTURE

This course shall be for a period of three academic years and commencing from August. Each year is divided into two semesters. There is no session vacation. There will be 1 year of compulsory internship with stipend at the end of the course for successful candidates.

Academic Time:

Monday to Saturday - 8:00AM to 5:00 PM

Academic time is devoted to

1. Theory classes
2. Lecture demonstrations
3. Seminars/Group discussion
4. Practical works in OPD (out patient department), various laboratories, clinics, and ophthalmic investigative labs and community work. Time will be dedicated for community work especially screening for diseases as part of the Teleophthalmology project

First Year

Twenty eight theory lectures per month (each one hour) and two seminars in a month (each two hours)
Total theory time per month: 28 hrs/month
Practical postings: 96 hrs/month
Total academic time per month: **124 hrs**

Second Year

Twenty eight theory lectures per month (each one hour) and two seminars in a month (each two hours)
Total theory time per month: 28 hrs/month
Practical postings: 96 hrs/month
Total academic time per month: **124 hrs**

Third Year

Twelve theory lectures per month (each one hour) and two seminars in a month (each two hours)
Total theory time per month: 12 hrs/month
Practical postings: 120 hrs/month
Total academic time per month: **132 hrs**
Essential diagnostic skills at the end of the course:

- **Tonometry**
  1. Applanation
  2. Indentation (commonly Schiots)

- **Assessment of Epiphora**
  1. Jone’s drytest
  2. Syringing – performance & interpretation

- **Dry eye evaluation**
  1. Schirmer test
  2. Rose Bengal staining
  3. Tear film breakup time
  4. Tear meniscus evaluation

- **Corneal ulceration**
  1. Taking a corneal scraping
  2. Inoculation into media
  3. Evaluation of Gram’s stain
  4. Evaluation of KOH preparation
  5. Corneal wedge biopsy

- **Direct ophthalmoscopy**
  1. Distant direct
  2. Media assessment
  3. Use of filters provided

- **Indirect ophthalmoscopy**
  1. Scleral depression
  2. Fundus drawing capability
  3. Use of filters provided

- **Slit Lamp Examination**
  1. Diffuse examination
  2. Focal examination
  3. Retroillumination – direct & indirect
  4. Sclerotic scatter
  5. Specular reflection
  6. Staining modalities and interpretation

- **Slit Lamp Accessories**
  1. Applanation Tonometry
    1. Goldman’s applanation
  2. Gonioscopy
    1. Grading of the angle
    2. Testing for occludability
    3. Indentation gonioscopy
3. 3-mirror examination of the fundus
4. 78-D / 90-D / examination
5. Optical Pachymetry
6. Slit lamp photography

- Colour vision evaluation
  1. Ishihara pseudoisochromatic plates
  2. Other tests including
     1. Farnsworth – Munsell 100 – hue or 15 – hue tests
     2. Holmgren’s wols
     3. Edridge – Green lantern

- Use of Amsler’s charting
  1. Instructing in the use of and interpreting the chart

- Corneal topography and corneal mapping
  1. Interpretation of corneal topography mapping

- Specular microscopy of the corneal endothelium

- Keratometry
  1. Performance & interpretation of keratometry
  2. Diagnosis of situations such as keratoconus

- Fundus photography & fundus fluorescein angiography (FFA, FAG)
  1. Doing and evaluating stereoscopic fundus photographs
  2. Performance of and interpretation of FFA
  3. Performance of indirect fluorescein angioscopy

- Refraction
  1. Retinoscopy
  2. Streak Retinoscopy
  3. Use of trial set
  4. Use of Jackson’s cross-cylinder
  5. Subjective and objective refraction
  6. Prescription of glasses for all types of refractive errors
  7. Knowledge of manufacture, fitting & dispensing of glasses

- Autorefractometry
  1. Use of and interpretation of autorefractometer

- Diagnosis & assessment of Squint
  1. Ocular position and motility examination
  2. Versions, ductions and vergences
  3. Convergence facility estimation
  4. Cover/ Uncover/ Alternate cover test
  5. Use of prism bars or free prisms in assessment of squint
  6. Use of Synaptophore
  7. Use of Bagolini’s striated glasses / red filters / Maddox rod
8. Use of Worth’s four dot test
9. Use & interpretation of the Hess chart / Lees’ screen
10. Performance & interpretation of diplopia charting
11. Diagnosis of amblyopia

- Exophthalmometry
  1. Use of Hertel’s exophthalmometer
  2. Use of Luedde’s exophthalmometer
  3. Use of other exophthalmometers
  4. Measurement of proptosis or Exophthalmos

- Use and evaluation of ophthalmic ultrasound
  1. A-scan ultrasound with biometry
  2. B-scan ultrasound : performance & interpretation

- Interpretation of perimetry
  1. Tangent screening
  2. Goldman perimeter & interpretation
  3. Static computerized perimetry
     1. Interpretation of commonly

- Radiology
  1. Interpretation of plain skull films
  2. PA-20 (Caldwell’s view)
  3. PNS (Water’s view)
  4. Lateral
  5. Submentovertical
  6. Optic canal views
  7. Localisation of intra ocular and intra orbital FBs

- Interpretations of contrast studies
  1. Performance & interpretation of dacryocystograms
  2. Performance and interpretations of orbital venograms
  3. Interpretation of carotid angiograms

- Interpretation of CT –Scan & MRI Scans
  1. Orbital CT interpretation & orbital MRI evaluation
  2. Brain CT interpretation

- Understanding of current techniques & specialized investigations
  1. OCT
  2. UBM
  3. ERG / VEP
Syllabus

1. Hospital environment and role of student.
2. The profession & Ethics
3. Communications with the patients.
5. Social welfare of eye patients.
6. Law and the Optometry.

FIRST YEAR

Paper I - Basic Science - Anatomy, Physiology and Biochemistry of the Eye

1. OCULAR ANATOMY
   1. Embryology of the eye in general
   2. Orbit and its immediate relations
   3. Lids and eye lid glands
   4. Conjunctiva. Cornea and Sclera
   5. Iris and Cilliary body
   6. Lens and Vitreous
   7. Retina & Choroid
   8. Ocular Muscles
   9. Visual pathways
   10. Sympathetics and parasympathetics system
   11. Vascular supply of eye
   12. Lacrimal apparatus
   13. Higher visual centres
   14. Angle of anterior chamber

2. OCULAR PHYSIOLOGY
   - General physiology of the eye - An introduction
   - Maintenance of Transparency of the Cornea
   - Maintenance of Transparency of the Lens
   - Visual acuity and form sense
   - Pupillary reflexes
   - Accommodation
   - Convergence
   - Intra Ocular Pressure
   - Night Vision
   - Colour Vision and colour blindness
   - Visual Fields – Methods and types of field defects
   - Extrinsic Muscles, Actions and Ocular Movements
   - Higher Visual Centres and righting reflexes
   - Electrophysiological Aspects
   - Conjugate and Disguate -Movements of the eye
   - Aqueous production and its drainage
3. OCULAR BIOCHEMISTRY

- Introduction to various biochemical test
- Tears film and pH
- General Introduction to metabolic processes affecting the eye
- Rhodopsin cycle
- Aqueous and Vitreous humours
- Metabolism of lens and cornea.

Paper II - PHYSIOLOGICAL OPTICS AND ORTHOPTICS

1. Optics:

- Elementary basis of light- Interference, diffraction, polarization spectrum, surface tension, viscosity
- Principles of Refraction.
- Physical Optics -1, Lens Shapes -Convex, Concave
- Physical Optics -2, Thin Lens equation, thick lens equation
- Physical Optics -3, Front and back vertex power
- Physical Optics -4. Aberrations
- Physical Optics -5. Spherical, Cylindrical & Toric surfaces, Aspheric surfaces
- Prisms -definition, uses, nomenclature, apex
- Determination of focal length & diopteric power of lens
- Strum’s Conoid
- Neutralization of lenses
- Focimeter
- Centre & Axis Marking by focimeter
- Simple & Toric transposition
- Prismatic effect & Decentration
- Schematic eye
- Emmetropia & Ammetropia -Aetiology, Population, Distribution,Growth of eye,
- Myopia
- Hypermetropia
- Astigmatism
- Aphakia/Pseudo-phakia
- Presbyopia
- Keratoconus
- Post-Op. Refractive errors
- Refraction of irregular reflex
- Accommodation & Convergence -1, Far point, near point, range, amplitude of accommodation
• Retinoscopy -Principle, Optics & Methods
• Objective Refraction
• Subjective Refraction
• Cross Cylinder
• Test chart standards
• Phoropter
• Objective Optometer
• Projection Charts
• Refraction room Standards

2. ORTHOPTICS

1. Strabismus – Basics, Consequences and adaptations
2. Synoptophore
3. Maddox wing
4. Maddox rod
5. Prism bar
6. Binocular single vision – Grades, requirements and advantages
7. Convergence exercises

SECOND YEAR

Paper III - REFRACITION AND CLINICAL OPHTHALMOLOGY

1. REFRACITION
   2 Myopia
   3 Hypermetropia
   4 Astigmatism
   5 Aphakia/Pseudo-phakia
   6 Presbyopia
   7 Keratoconus
   8 Post-Op. Refractive errors
   9 Refraction of irregular reflex
   10 Accommodation & Convergence –1. Far point, near point, ranges. Amplitude of accommodation
   12 Retinoscopy -Principle & Method
   13 Objective Refraction
   14 Subjective Refraction
   15 Cross Cylinder
2. CLINICAL OPHTHALMOLOGY

- Conjunctivitis
- Symptomatic conditions of conjunctiva
- Congenital anomalies of cornea
- Corneal dystrophies
- Abnormalities of corneal transparency
- Corneal ulcer
- Scleritis & episcleritis
- Cataract
- Glaucoma
- Pterygium
- Uveitis
- Anomalies in the position of eye lashes & lid margin
- Inflammations of eye lid
- Proptosis & measurements
- Ptosis & measurements
- Tumours of eye lid
- Diabetic retinopathy & other retinal disorders
- Optic neuritis
- Papilloedema
- Blepharitis
- Vitamin A deficiency
- Intra-ocular tumours
- Ocular Injuries

Paper IV - INVESTIGATIVE OPHTHALMOLOGY AND OCULAR PHARMACOLOGY

1. INVESTIGATIVE OPHTHALMOLOGY

ORTHOPTICS

- Orthoptics-General Concept
- Ocular muscles and movements
- AC/ A ratio
- Measurements of angle of squint
- Latent squint
- Maddox rod
- Maddox wing
- Synoptophore
- Manifest concomitant
- Squint concomitant
- Paralytic Squint
- Head posture and its significance
- Hess Screening and its Interpretations
- Pleoptics
- Occlusion -types and uses
- Nystagmus
• A. V. Syndromes
• Testing of ARC
• Amblyopia
• Disorders of accommodation
• Paediatric visual acuity assessment
• Paediatric Refraction
• Neural aspects of binocular vision

2. OCULAR PHARMACOLOGY

• Ocular Pharmacology – An introduction
• Autonomic nervous system
• Routes of drug administration
• Miotics, Mydriatics & Cycloplegics drugs
• Antibacterial drugs & therapy
• Antifungal drugs & therapy
• Anti-Viral drugs & therapy
• Antibacterial drugs & therapy
• Anti-inflammatory drugs & therapy
• Anti-glaucoma drugs & therapy
• Ophthalmic dyes
• Local Anaesthetics
• Ophthalmic preservatives
• Ocular lubricants
• Ocular irrigating solutions
• Ocular antiseptics & disinfectants
• Anti-cataract agents
• Contact lens solution
• Chelating agents
• Immunosuppressive agents

Paper V - OPHTHALMIC INSTRUMENTS AND APPLIANCES

- Indirect Ophthalmoscope
- Direct Ophthalmoscope
- Slit Lamp: Haag-Streit.
- Photo-slit lamp
- Lensometer. Lens gauge- Manual and automated
- Tonometer
- Fundus Camera
- External eye photography
- Auto-refractometer
- Corneal Examination -1. Placido disc
- Corneal Examination -2. Keterometer
- Corneal Examination -3. V KG
- Corneal Examination -4. Specular Microscopy
- Corneal Examination -5. Aesthesiometer
- Corneal Examination – 6. Corneal topography
- Exophthalmometer
- Perimeter – Manual & automated
- Orthoptics Instruments -Haploscope/Home devices
- Heidelberg Retino-tomography HRT -II
- Nerve fiber analyzer
- Frequency doubling perimeter
- Non Contact Tonometer
- Heidelberg Analmascope
- Pachymeter
- Contrast sensitivity tests
- Glare acuity tests
- Colour vision tests
- Dark adaptometer
- Aberrometer
- Streak retinoscope

THIRD YEAR

Paper VI - ADVANCED OPTICS AND ORTHOPTICS

1. ADVANCED OPTICS

   2. Myopia
   3. Hypermetropia
   4. Astigmatism
   5. Aphakia/Pseudo-phakia
   6. Presbiopia
   7. Keratoconus
   9. Refraction of irregular re/ex
   10. Accommodation & Convergence -1. Far point, near point, range, amplitude of accommodation
   12. Retinoscopy -Principle & Methods
   13. Objective Refraction
   14. Subjective Refraction
   15. Cross Cylinder

2. ADVANCED ORTHOPTICS

   1 Orthoptic-General concept
   2 Ocular muscles and movements
   3 AC/ A ratio.
4 Measurements of angle of squint
5 Latent squint
6 Maddox rod
7 Maddox wing
8 Synoptophore
9 Manifest concomitant
10 Squint concomitant
11 Paralytic Squint
12 Head posture and its significance
13 Hess Screening and its Interpretations
14 Pleoptics
15 Occlusion -types and uses
16 Nystagmus
17 A. V. Syndromes
18 Testing of ARC
19 Amblyopia
20 Disorders of accommodation
21 Paediatric visual acuity assessment
22 Paediatric Refraction
23 Neural aspects of binocular vision

Paper VII - REFRACTION AND OPTICALS

1. CLINICAL & ADVANCED REFRACTION

- Myopia
- Hypermetropia
- Astigmatism
- Aphakia/Pseudo-phakia
- Presbyopia
- Keratoconus
- Post-Op. Refractive errors
- Refraction of irregular reflex
- Accommodation & Convergence -1. Far point, near point, range, amplitude of accommodation
- Retinoscopy -Principle & Method
- Objective Refraction
- Subjective Refraction
- Cross Cylinder
- Low- Vision aids: Techniques & microscopes
- Rehabilitation of blinds
2. OPTICALS

- Workshop
- Manufacturing Spectacle Lens
- Measurement for ordering spectacle, IPD, Marking centration, V. D. Calculation.
- Fitting Bifocals, Multifocals, Prism Lenses
- Fitting Lenses in Frames
- Glazing & Edging
- Final Checking, Adjustments to prescriptions
- Patient complains, handling correction.
- Repair of spectacles
- Special types of spectacles monocells/ptosis hemianopic glasses
- Neutralization of lenses
- Shape of Spectacle Frame -Measurements & Making, Frame & Face Measurements
- Refraction under the supervision
- Aberrations & Tints in spectacle Lenses
- Spectacle Lens Manufacturing - Sphericals, Toric, Bifocals, Lenticular & Lab Visit
- Spectacle Frames -History, Nomenclature, Types & parts, sides, joints, frame bridge.
- Plastic Lenses -Manufacturing & Characteristic
- Lens Designs -Aspheric
- High Index Lenses
- Photocromatic Lenses
- Tinted Lenses
- Polaroid Lenses
- Bifocals

Paper VIII - COMMUNITY OPHTHALMOLOGY, INVESTIGATIONS & PARA CLINICAL SCIENCE.

1. COMMUNITY OPHTHALMOLOGY

- Concepts of community Ophthalmology - I
- Concepts of community Ophthalmology - II
- The Epidemiology of Blindness (General Principles) - I
- The Epidemiology of Blindness (General Principles) - II
- The Epidemiology of Blindness (Disease specific strategies) - III
- The Epidemiology of Blindness (Disease specific strategies) - IV
- Survey Methodological - I
- Survey Methodological - II
- Survey Methodological - III
- Screening procedures in Ophthalmology – I
- Screening procedures in Ophthalmology – II
- School eye screening programme
• Primary eye care
• Organization of Outreach services
• Organization of Reach-in-Programme
• Information, Education, communication
• Rehabilitation of the visually handicapped
• National programme for control of Blindness – I
• National programme for control of Blindness – II
• Vision 2020 : The Right to sight

2. EYE BANK

• Publicity
• How to donate your eyes
• Collection of eyes
• Preservation of eyes
• Pre-operative Instructions
• Post-operative Instructions
• Latest techniques for preservation of donor Cornea

3. INVESTIGATIONS IN CLINICAL OPHTHALMOLOGY

• Principle, Techniques and preparation of the patient
• ERG
• EOG
• Electro-Oculomyo-gram
• Ultra-sono-graphy
• Tonography
• Berman’s Locator/Foreign body locator
• Fluorescein Angiography
• Ocular Photography - anterior segment
• Dark Adaptometry : Adaptation & Adaptometry
• Syringing & Lacrimal function Test
• Gonioscopy
• Pachometry
• Perimetry
• Laser therapy
• Contrast Sensitivity
• Slit Lamp
• VKG
• Specular Microscopy
• Fundus Photography
• Colour Vision Investigations – Ishhara Charts, E-G Lantern, Negal’s anomalouscope, 100 Hue Test
• A-Scan Biometry
• Heidelberg Retina-tomography HRT –II
• Nerve fiber analyzer
• Frequency doubling perimeter
• Non Contact Tonometry
• UBM
• OCT
• NCT
• Applanation and schiotz tonometry
• Keratometry
• Focimetry
• VEP

4. OCULAR PATHOLOGY

• Immunology of the eye
• Immunology of the corneal grafting
• Retinoblastoma
• Melanoma

5. OCULAR MICROBIOLOGY

• Introduction to Microbiology & classification.
• Gram Positive Bacteria
• Gram Negative Bacteria
• Fungi -sephrophytics and pathogenic
• Virus
• Aseptic techniques
• Chlayadiga & parasites.

Paper IX - CONTACT LENS, OPHTHALMOLOGY OT AND NEWER ADVANCES

1. CONTACT LENS

1. History of Contact Lens
2. Corneal Anatomy and Physiology
3. Corneal Physiology and Contact Lens
4. Preliminary Measurements and Investigations
5. Slit Lamp Biomicroscopy
6. Contact Lens materials
7. Optics of the Contact Lens
8. Glossary of Terms: Contact Lenses
9. Indications and Contra Indications Contact Lens
10. Rigid gas permeable contact lens design
11. Soft Contact lens design & manufacture
12. Kertometry, Placido's disc, Tonography
13. Fitting philosophies
14. Fitting of Spherical SCL and effect of parameter changes
15. Astigmatism correction options
16. Fitting Spherical RGP contact Lenses, Low OK, High OK
17. Effects of RGP contact Lens parameter changes on lens fitting
18. Fitting in Astigmatism (Sph RGP)
19. Follow-up post fitting examination
20. Follow-up Slit Lamp examination
21. Fitting in Keratoconus
22. Fitting in Aphakia, Pseudophakia
23. Cosmetic Contact Lenses
24. Fitting Contact Lens in children
25. Toric Contact Lenses
26. Bifocal Contact Lenses
27. Continuous wear and extended wear lenses
28. Therapeutic Lenses/Bandage lenses
29. Contact lens following ocular surgeries
30. Disposable contact lenses, frequent replacement and Lenses
31. Use of Specular Microscopy and Pachymetry in Contact Lenses
32. Care & maintenance of Contact Lenses
33. Contact Lens modification of finished lenses
34. Instrumentation in contact lens practise
35. Checking finished lenses parameters
36. Recent developments in Contact lenses
37. Review of lenses available in India

MANAGEMENT OF OT

- Introduction to Ocular in general.
- Asepsis: How to achieve
- Anaesthetic agents and where indicated
- 0 T Sterilization procedures
- Sterilization procedures of 0 T Instruments
- Maintenance of Instruments and equipments: Ophthalmic Instruments
- Maintenance of Instruments and equipments: Orthoptics Instruments
- Maintenance of Instruments and equipments: Surgical Instruments
- Maintenance of Instruments and equipments: Optometric & Contact Lens Equipment

NEWER ADVANCES

- Progressive lenses
- Aspheric and hi-index lenses
- Scleral contact lenses and other newer lenses
- Intra-ocular lenses
- Refractive surgeries
- Autofluorescence imaging
- OCT Angiography
- Phakonit
- Femtosecond cataract surgery
- Telemedicine
- Retinal implants
- Lasers in ophthalmology
SEMINARS

All students have to attend Seminars

TO BE PRESENTED BY FIRST YEAR

1. Optics

   1.1. Frames & Spectacle Lens Materials
   1.2. Quality control methods of Spectacle Lens
   1.3. Application of focimeter and Genva lens measure in Optical dispensing.

2. Refraction

   2.1. Visual acuity methods
   2.2. Principles and application of Retinoscopy
   2.3. Explanation of various types of refractive error

3. Advanced Refraction

   3.1. Comparison between Static and Dynamic Retinoscopy
   3.2. Subjective Methods of Refraction
   3.3. Objective Methods of Refraction

TO BE PRESENTED BY SECOND YEAR

1. Anterior Segments

   1.1. Introduction of eye disorders
   1.2. Physiology & Investigations for corneal disorders
   1.3. Physiology & Investigations for lenticular disorders

2. Posterior Segments

   2.1. Anatomy and physiology of retina & optic nerve
   2.2. Principles of direct & indirect Ophthalmoscopy
   2.3. Principles of FA & Laser therapy

3. Tonometry

   3.1. Principles & comparison of various types of tonometry
   3.2. Standardization of various types of tonometers
   3.3. Special methods in tonometry

4. Perimetry
4.1. Theoretical Comparison between Static & Kinetic Perimetry
4.2. Static & Kinetic Perimetry - practical view
4.3. Standardization of perimeters and the factors affecting its reliability.

TO BE PRESENTED BY THIRD YEAR

1. Orthoptics
   1.1. Diagnosis of latent and manifest squint
   1.2. Paralytic squint investigations
   1.3. Amblyopic and pleoptics treatment

2. Posterior Segments
   2.1. Normal & pathological fundus
   2.2. Fundus Camera & application of FA.
   2.3. Lasers and its uses in Ophthalmology

3. Cornea and Refractive Surgery
   3.1. Clinical investigations of pre-refractive Surgery
   3.2. Clinical investigations of post-refractive Surgery
   3.3. Clinical analysis of refractive Surgery

4. Advanced Refraction and Contact Lenses
   4.1. Low vision aids for poor vision patients
   4.2. Materials and manufacturing techniques of contact lenses
   4.3. Indications & Contra-indications for Contact Lenses

5. Advanced Contact Lenses
   5.1. Fitting philosophies of contact lenses
   5.2. Post fitting problems of contact lenses and its remedy
   5.3. Toric/Bifocal Contact lenses

6. Perimetry in Ocular disorders
   6.1. Visual fields defects in Glaucoma
   6.2. Visual fields defects in retinal & neurological disorders
   6.3. Latest development in perimetry

LIST OF LECTURES

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Anterior Uveitis/ symptoms, sign & investigation
Management of Uveitis
Diabetic Retinopathy
Vascular blocks & ARMD
Retinal detachment & Tumour
QUIZ
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NEWER DIAGNOSTIC SURGERY
OPTIC NERVE -1
OPTIC NERVE -2
EYE BANKING -
INSTRUMENTS
INSTRUMENTS

RECOMMENDED BOOKS AND JOURNALS

Recommended books:

1. Parson’s Diseases of eye
2. Duane’s System of Ophthalmology
3. Jakobiec Series
4. Peyman’s Series
5. Pathology gross specimens Duke-Elder’s System of Ophthalmology
6. American Academy Series
7. Podos & Yanoff Series
8. Jack Kanski: Clinical Ophtalmology
9. Cornea:
   1. Smolin & Thoft
   2. Grayson
   3. Kaufman & Leibowitz

10. Glaucoma
    1. Bruce Shields Text Book of Glaucoma
    2. Krupin & Shields Series on Glaucoma
    3. Becker & Schaeffer’s Text Book of Glaucoma
    4. Anderson’s Computerized Perimetry
    5. Harrington’s Text Book of Perimetry
    6. Leiberman and Drake: Computerized perimetry

11. Retinal disease:
    ◦ Stephen Ryan’s Retina
    ◦ Ron Michel: Retina; Detachment
    ◦ Steve Charles: Basic Vitrectomy

12. Ultra Sound:
    Sandra Byrne & Ronald Green: Ophthalmic Ultrasound
13. Uvea:
   Nussenblatt & Palestine
   Smith & Nozik

14. Neuroophthalmology:
   a. Walsh & Hoyt

15. Orbital disease:
   a. Rootman’s diseases of the orbit
   b. Jakobiec & Snow – Diseases of the orbit

16. Tumours:
   a. Jerry Shields – Diagnosis and management of orbital tumours
   b. Jerry Shields – Diagnosis and management of ocular tumours

17. Strabismus:
   a. Gunter von Noorden
   b. Mein & Trimble

18. Ophthalmic Pathology:
   a. Yanoff & Fine
   b. Zimmerman

19. Pharmacology:
   a. Havener

20. Anatomy:
   a. Wolff
   b. Snell’s

21. Physiology
   a. Adler’s Physiology of the eye

22. Biochemistry:
   a. Standard text books

23. Immunology:
   a. Ocular Immunology

24. Paediatric ophthalmology
   a. Keeneth Wright

25. Refraction:
   a. Duke Elder’s practice of refraction
   b. Elkington & Frank

**FOURTH YEAR**

**Internship**

**Description:**
One-year compulsory internship in various clinical areas in Amrita Institute of Medical Sciences during which the students get to hone their skills and knowledge acquired in the three years of rigorous study. During this period their work is very
similar to what is expected from them after the completion of their training. The training ensures their readiness to approach a patient in any setting.

**Eligibility:**
Student who has successfully completed his/her theory and practical in the first three years of the programme.

**Duration:**
One year (compulsory Internship) at Amrita Institute of Medical Sciences.

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### SCHEME OF EXAMINATION

#### B.Sc Optometry Degree Examination

**Distribution of Marks for each subject**

<table>
<thead>
<tr>
<th>Paper No</th>
<th>Paper Name</th>
<th>Theory</th>
<th>Theory Internal</th>
<th>Theory Viva</th>
<th>Practical External</th>
<th>Project</th>
<th>Total</th>
<th>Grand Total</th>
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<td><strong>FIRST YEAR</strong></td>
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PATTERN OF QUESTION PAPERS

The duration of each theory paper will be three hours; the paper will have only one section of 100 marks.

Pattern of Question Paper
- Structured Essay (4 out of 4) - 40 marks (4 x 10 marks)
- Short Notes (6 out of 8) - 30 marks (6 x 5 marks)
- Short answer question (10 out of 12) - 30 marks (10 x 3 marks)

Total Marks - 100 marks

IMPORTANT TELEPHONE NUMBERS

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Chief Programme Administrator : +91 7034028019, Oncall: 1919
Programme Co-ordinator : +91 7034028118, Oncall: 6976