Examination Information Pack

Part 1 FRCOphth Examination

The ROYAL COLLEGE of OPHTHALMOLOGISTS

Dear Colleague

Thank you for your enquiry concerning the College's Part 1 Fellowship (FRCOphth) Examination.

Please find enclosed information concerning:

Registration Information
Admission Procedure
Guidance for Candidates with Additional Needs
Policy on Allegations of Cheating in Examinations
Appeals Procedure
Language Requirements
Preparing for Examinations
Fees Schedule
Examination Timetable
Examination Structure
Standard Setting
Examination Syllabus
Reading List
Application Form
Equal and Diversity Monitoring Form

Candidates must hold a medical qualification approved by the General Medical Council of the United Kingdom (GMC) or of Ireland for the purpose of registration.

Please note candidates are required to submit an attested copy of their medical degree in evidence of their eligibility to sit this examination. Medical degree certificates may be attested by a Fellow or Member of *this* College, the British Council or your embassy, a solicitor or the university issuing the certificate. Candidates who are registered with the General Medical Council (GMC) are not required to submit an attested copy of their medical degree but should include their GMC number in the appropriate place on the application form for verification.

No previous experience in ophthalmology is necessary for candidates to sit the Part 1 FRCOphth but trainees in ophthalmic specialist training are required to pass this examination before they enter into the **third** year specialist training. Please note that as of 1 August 2013, candidates are permitted a maximum of six attempts in which to pass this examination. Examination attempts prior to August 2013 do not count towards the number of attempts available.

The structure of this examination is based on learning outcomes from the first two years of training of the Curriculum for Ophthalmic Specialist Training. This curriculum is only available in web-based format at: http://curriculum.rcophth.ac.uk. The syllabus is assessed by written examination.

The above information has been agreed by the Council of The Royal College of Ophthalmologists.

This information is subject to variation at the discretion of the Council.

Yours sincerely

Susannah Grant
Head of the Examinations Department

REGISTRATION INFORMATION

Candidates wishing to confirm the eligibility of their medical degree for the purpose of registration with the General Medical Council may do so by the following means:

You can access the World Directory of Medical Schools at the below link:

https://search.wdoms.org/

Candidates are required to submit an attested copy of their medical degree or details of their GMC registration in evidence of their eligibility to sit this examination.

Regulations

The following notes on the regulations concerning applications for admission to the examinations are published for the guidance of candidates:

1. Completed applications for admission to an examination must reach the Examinations Department **no later than 5.00pm on the closing date**, namely approximately **FIFTY-SIX** days before the exam is held. It is not possible to accept applications received after the closing date.

2. The application forms must be accompanied by **the fee** and **such certification as is required by the regulations**. If you cannot supply all the relevant certification **you must contact the Examinations Department or supply a covering letter as to the reasons why**. All outstanding certification must be sent **within 14 days after the closing date**, if not before, otherwise the candidate **will be** withdrawn from the examination and forfeit their examination fee. Applications submitted without the required fee will not be accepted.

3. Upon receipt of application the Examinations Department will send all candidates a written receipt. Detailed instructions including written and clinical examination dates will be dispatched to all candidates within ten days after the closing date for receipt of applications.

4. Applicants wishing to withdraw or transfer their entry for an examination must notify the Examinations Department in writing by 5.00pm on the closing date for receipt of applications. Fees cannot be refunded or transferred after this time.

5. Applicants must apply for entry visas for the United Kingdom in good time prior to the date of the examination. In exceptional circumstances, if written evidence of the refusal of a visa is provided, the Examinations Committee will consider requests for candidates to transfer their examination entry, subject to the receipt of a 20% administration charge.

6. Candidates unable to attend an examination will forfeit their examination fee. In exceptional circumstances, the Examinations Committee will consider requests to transfer a candidate's entry to the next examination sitting subject to receipt of written supplementary evidence (e.g. a detailed medical certificate, a death certificate for a close family member) and subject to a 20% administration charge. Please note that lack of preparation is not considered a suitable reason to withdraw or transfer an examination entry.

7. All candidates will receive feedback regarding their individual performance in the examinations.

8. Results are posted by First Class Mail with the Pass List being displayed on the College Website. Results are only released upon approval of the Senior Examiner. We regret that examination results are not available by telephone or email.

Written Examination Procedures

1. Unless notified, candidates are **not permitted** to use calculators in any section of the examinations.

2. Candidates are only allowed to bring pens/pencils etc. into the examination in a clear plastic pencil case or plastic bag.

3. Candidates are forbidden to communicate in any way with, seek assistance from, give assistance to, or interfere with the work of other candidates or the invigilators in the examination room or elsewhere during the period of the examination, or indulge in any other form of unfair practice.

4. The Senior Invigilator has the power to expel a candidate from the examination room.

5. Candidates are advised to read the Policy on Allegations of Cheating and Misconduct in Examinations.

6. Candidates are not allowed to use mobile phones. All mobile phones **must be switched off and must <u>not</u> be kept on the candidate's person.** Clear instructions will be given to candidates regarding the timing of the examination.

7. Photographic identification (such as a passport or photographic driver's licence) will be checked before candidates are admitted to the examination hall. Candidates are also required to sign a register when entering written examinations.

8. Candidates are NOT permitted to enter a written examination 30 minutes after the examination has started. The clock to be referred to will be the clock in the examination hall or the Senior Invigilator's watch.

9. No candidate is allowed to leave the examination hall in the first 30 minutes of a written examination. No candidate is allowed to leave the examination hall in the last 10 minutes of a written examination to avoid disruption to candidates completing their work.

10. Candidates deciding to leave the examination hall must submit their paper to the invigilator. They will not be permitted to re-enter the examination hall.

11. Candidates are asked to raise their hand should they have a query regarding any part of the examination.

12. Candidates requiring a comfort break must raise their hand and wait to be escorted by an invigilator. Only one candidate at a time is permitted outside the examination hall.

13. No books, written material or electronic equipment are allowed on the candidate's desk. All references to the examination such as letters and individual timetables are not permitted on the examination desk.

14. Candidates are **not allowed** to use scrap paper, all notes **must be** written on the answer sheet and crossed through as appropriate.

15. Candidates are advised that **no extra time** will be given to transfer answers from the question paper to the answer sheet.

Eligibility

A medically qualified candidate will be eligible to sit the examination provided that he/she:

a) holds a medical qualification approved by the General Medical Council for the purpose of registration
b) has completed Foundation Training Year 1, or equivalent house officer post for International Medical Graduates (IMG)

Candidates who are registered with the General Medical Council (GMC) should include their GMC number in the appropriate place on the application form for verification.

All other candidates are required to submit an attested copy of their medical degree in evidence of their eligibility to sit this examination. Medical degree certificates may be attested by a Fellow or Member of *this* College, the British Council or your embassy, a solicitor or the university issuing the certificate.

Condition of the Examination

No previous experience in ophthalmology will be necessary for candidates to sit the Part 1 FRCOphth but candidates in Ophthalmic Specialist Training (OST) will be required to pass this examination before they enter into the **third** year of OST.

Candidates sitting this examination before commencing OST should note that a pass in this examination will not count towards CCT if taken out of training unless the candidate enters or re-enters the training programme within 7 years of passing.

Guidance for candidates with additional requirements

The Royal College of Ophthalmologists recognise that there may be some candidates who require additional arrangements when undertaking a Royal College of Ophthalmologists' examination.

All candidates who require additional arrangements must adhere to the guidelines set out below. Candidates must note that upon receipt of sufficient evidence additional arrangements may not necessarily be granted.

In awarding additional arrangements the Royal College of Ophthalmologists seek to:

1. Approve valid arrangements and access to written and clinical examinations.
2. Give special consideration to candidates where specific circumstances have arisen at or near to the examination time which have not previously been highlighted.
3. Ensure that no additional arrangement gives an unfair advantage over another candidate

When submitting their application form applicants must indicate if additional arrangements are needed and supporting evidence must be provided at the time of application. Examples of the types of supporting evidence required are as follows:

- Detailed doctor's note
- Up to date literacy assessment
- A statement of Special Educational Needs
- A relevant diagnostic report regarding the learning disability
- Historical evidence of the disability

<u>Extra time award:</u>

An additional allowance of up to and including 25% may be awarded to those candidates requesting special consideration for extra time and only on approval of the supplementary evidence.

<u>Specialist equipment:</u>

The Royal College of Ophthalmologists will consider special request from candidates for specialist equipment such as:

- Additional lighting
- Larger desk to accommodate specialist equipment
- Separate room
- Supervised rest breaks

All additional requirements will be considered by the Chairman of the Examinations Committee.

ALLEGATIONS OF CHEATING AND MISCONDUCT IN EXAMINATIONS

FRCOphth, Refraction Certificate, DRCOphth Examinations and the Certificate in Laser Refractive Surgery

Candidates should note that by entering to sit an examination they are deemed to have read and understood and agreed to abide by all relevant examination regulations.

1.0 Introduction

1.1 Cheating and other misconduct, whether attempted or successful, will be penalised very severely by the Council of the Royal College of Ophthalmologists. Candidates found to be in possession of unauthorised material or equipment, including mobile phones, during an examination will be deemed to be guilty of misconduct whether the items have been used or not. Cheating and misconduct includes, but is not restricted to:

- Plagiarism (for the full policy please see www.rcophth.ac.uk/examinations)
- Taking unauthorised material into the examination
- Taking unauthorised material from the examination
- Copying from other candidates or unauthorised material
- Talking to other candidates
- Passing notes
- Failure to respond to the instructions of an invigilator or examiner
- Bribery
- Unauthorised access to examination papers
- Copying or alteration of certificates
- Discussing clinical cases with other candidates (if either party has not yet sat the examination)
- Unacceptable or disruptive behaviour

1.2 Candidates may **not** take the following items into a written or practical examination:

- Spare paper, including revision notes
- Electronic equipment
- Calculators

In addition:

- All mobile phones must be switched off and not on the candidate's person. Candidates should note that invigilators may employ the use of a device to detect the use of mobile phones. Candidates who have no other personal effects with which to store their switched off mobile phone, should surrender the device to the Senior Invigilator for the duration of the examination.
- Alarms on watches/clocks/mobile phones must be turned off
- Personal belongings should be placed at the back or side of the examination hall or appropriate place, as advised by the invigilator. Valuables should not be brought to the examination as the College cannot take responsibility for any loss of or damage to personal belongings.

1.3 Candidates are not permitted to talk to, pass information to, or signal to another candidate whilst the examination is in progress.

1.4 Candidates are reminded that it is a serious sanctionable offence to attempt to impersonate another person or to have another person impersonate you during any part of the College's examinations. Photographic identification will be checked by College Staff at the start of every examination.

2.0 Preliminary Procedure

2.1 In the event that a candidate is suspected of cheating or misconduct by an invigilator or College Examiner, the Senior Invigilator shall confiscate any unauthorised materials or equipment in the possession of the candidate. Candidates must, on request, surrender to the Senior Invigilator any materials or equipment reasonably suspected by the invigilator not to be permitted. The Senior Invigilator shall include all such materials with their report and they may be retained at the absolute discretion of the Chairman of the Examinations Committee. If candidates fail to surrender

materials or equipment requested by the Senior Invigilator it will be deemed that the alleged offence has occurred.

2.2 Details of the allegation will be made known to the Head of the Examinations Department. The following procedures will be followed:

i. The invigilator will submit a written report outlining the particulars of the allegation. If an allegation is made during a practical examination, the examiner concerned will note detailed information on the reverse of the candidate's mark sheet.

ii. If the Head of the Examinations Department considers the suspicion of cheating or misconduct to be well founded, he/she will submit a report to the Chairman of the Examinations Committee immediately following the examination.

iii. Upon receipt of the Head of the Examinations Department's report, the Chair of the Examinations Committee will undertake any further investigation that he/she thinks appropriate.

iv. If the Chair of the Examinations Committee believes there to be no grounds or insufficient evidence to support the allegation of cheating or misconduct no further action will be taken.

3.0 Investigation Procedure

3.1 If the Chair of the Examinations Committee believes there are grounds that require further investigation, he/she will notify the candidate to inform them:

i. They are under investigation following an allegation of cheating or misconduct and that the results of their examination will be withheld pending an investigation.

ii. The candidate will be sent a copy of the Head of the Examination Department's report and any further evidence obtained by the Chair of the Examinations Committee. The candidate will be invited to submit a response to the allegations within a period of 28 days.

iii. The Chair of the Examinations Committee will call an Investigatory Board consisting of two Consultant Fellows, who are not Senior Examiners or current Council Members, and one member of the Lay Advisory Group who will review all the particulars of the case. The investigatory process will be kept confidential.

iv. The Head of the Examinations Department will act as Secretary to the Investigatory Board and will attend the Board as an observer. The Investigatory Board will otherwise conduct its inquiry in private and will decide whether it finds the allegation of cheating or misconduct proved on the balance of probabilities.

v. Where the Investigatory Board finds an allegation of cheating or misconduct proved on the balance of probabilities, the Head of the Examinations Department shall notify the candidate of the outcome and inform them they have 28 days from the date of the outcome letter to appeal the Investigatory Board decision.

vi. If, after 28 days, no further communication has been received from the candidate, the findings of the Investigatory Board shall be reported to the College Council at their next meeting. The College Council shall impose penalties on the candidate as it sees fit. Penalties for cheating and misconduct include, but are not restricted to:

a. Ruling the candidate's examination attempt as invalid
b. Referring the matter to the candidate's employer and, if in Ophthalmic Specialist Training, their deanery
c. Referring the matter to the General Medical Council or relevant Medical Board.

The candidate will be informed of the College Council's decision within 14 days after the Council meeting.

4.0 Appeal against the Outcome of the Investigatory Board

4.1 If the candidate wishes to appeal the findings of the Investigatory Board, a notice of appeal must be sent to the Chair of the Examinations Committee **to arrive within 28 days of the date of the outcome letter following the Investigatory Board**. Included in the notice of appeal must be the detailed grounds of appeal and all of the evidence that the candidate wishes to be considered.

4.2 A fee of £1000.00 must be received which will be refunded should the appeal be successful.

4.3 If reasonably practicable, the Chair of the Examinations Committee will convene an Appeal Panel within 8 weeks of a notice of appeal being received. The Appeal Panel shall be comprised of two Consultant Fellows and a member of the Lay Advisory Group who have not previously been involved in any aspect of the candidate's examination or the Investigatory Board and have no current or previous connection with the candidate. One of the members of the Panel shall be appointed Chair.

4.4 The Head of the Examinations Department will act as Secretary to the Appeals Panel and attend the Panel as an observer. He/she will agree the date of the hearing with the candidate.

4.5 The candidate will be invited to present his or her case in person to the Appeal Panel and is entitled to be accompanied by a friend whom the candidate shall identify in advance, providing 10 days' notice. The friend may advise and counsel the candidate but will not be allowed to make statements or take any part in the proceedings.

4.6 The Appeal Panel will review the findings of the Investigatory Board and may invite the Investigatory Board or the candidate to produce further evidence prior to the hearing. The Appeal Panel may summon any person to give evidence before it. Members of the Panel and the candidate may question any person before it.

4.7 The candidate will be informed of the outcome within 28 days of the hearing by the Secretary to the Appeal Panel. If the appeal is rejected, the Secretary to the Appeal Panel will inform the candidate of the reasons for the Panel's decision.

4.8 If the finding of the Appeal Panel is that the decision of the Investigatory Board be overturned no further action will be taken and the candidate's examination result published.

4.9 If the finding of the Appeal Panel supports that of the Investigatory Board, the Panel's findings shall be reported to the College Council at their next meeting as per Regulation 3.1vi above.

The candidate will be informed of the College Council's decision within 14 days of the date of the Council meeting.

4.10 There is no further right of appeal.

4.11 Any question arising in connection with the conduct of an appeal shall be determined fully and finally by the Chair of the Appeal Panel, who may take whatever steps he/she considers necessary to ensure that the appeal is handled fairly and efficiently.

Appeals Procedure

The College's appeal procedure is available online at www.rcophth.ac.uk/examinations/appeals-procedure/

Language Requirements

All examinations run by the Royal College of Ophthalmologists are conducted in English.

Although candidates are not expected to undertake examinations such as IELTS or PLAB it is expected that candidates should be equivalent to IELTS Level 7.

Preparing for the examinations

The Royal College of Ophthalmologists recommend that candidates preparing for examinations should:

- Read the appropriate text, syllabi and curriculum for the relevant examination.
- Gain clinical experience in ophthalmology in hospitals this may also include working within other specialties such and Medicine and Pathology.
- Attend courses – A list of courses for examinations can be found on the College website (the College does not run or endorse any of the listed courses).
- Ensure they are familiar with principles and values of the General Medical Council's Good Medical Practice (http://www.gmc-uk.org).

  Candidates may also find useful information from the National Advice Centre for Postgraduate Education. (http://www.nhscareers.nhs.uk/nacpme/)

EXAMINATION FEES 2016

PART 1 FELLOWSHIP EXAMINATION

Fee to sit examination	£550

REFRACTION CERTIFICATE

£655 (UK Centres)
£935 (Kuching, Malaysia)

PART 2 FELLOWSHIP WRITTEN EXAMINATION

Fee to sit examination	£400

PART 2 FELLOWSHIP ORAL EXAMINATION

Fee to sit examination	£630

CERTIFICATE IN LASER REFRACTIVE SURGERY

Fee to sit examination (per attempt)	£1300

An attempt constitutes the submission of Portfolio Assessment and any subsequent amendments prior to the proposed interview date.

Candidates deemed as unsuccessful after the submission shall not be permitted to attend the Portfolio Interview or Structured Vivas.

Candidates are required to submit payment of the fee for each attempt.

Additional Payments:

Replica certificates	£75 + VAT[3]
Appeal procedure	£250
Duke Elder	£10 (Undergraduate Prize examination fee for all candidates)

[3] From 1 January 2011 VAT is payable at the rate of 20%

THE ROYAL COLLEGE OF OPHTHALMOLOGISTS

PART 1 FRCOPHTH EXAMINATION

TIMETABLE 2016

January 2016

Examination Date: **Monday 11 January 2016**

Opening Date for Receipt of Applications: **Monday 28 September 2015**
Closing Date for Receipt of Applications: **Monday 16 November 2015**

May 2015

Examination Date: **Monday 9 May 2016**

Opening Date for Receipt of Applications: **Monday 18 January 2016**
Closing Date for Receipt of Applications: **Monday 14 March 2016**

October 2015

Examination Date: **Monday 10 October 2016**

Opening Date for Receipt of Applications: **Monday 20 June 2016**
Closing Date for Receipt of Applications: **Monday 15 August 2016**

Examination Venues:

- London
- Glasgow
- Sheffield

- Cairo
- Chennai
- Dubai
- Kuala Lumpur

Examination Format:

a.m.	Multi Choice Questions (MCQ) Paper (3 hours)
p.m.	Constructed Response Question (CRQ) Paper (2 hours)

Part 1 FRCOphth - Structure of the Examination

Introduction

Please note that as of 1 August 2013, candidates are permitted a maximum of six attempts in which to pass this examination. Examination attempts prior to August 2013 do not count towards the number of attempts available.

Candidates sitting this examination before commencing OST should note that a pass in this examination will not count towards CCT if taken out of training unless the candidate enters or re-enters the training programme within 7 years of passing.

Candidates who have entered Ophthalmic Specialist Training (OST) must have passed this examination by the end of the second year of run-through training.

The examination will comprise of theoretical papers based on learning outcomes of the OST curriculum appropriate to the first two years of training as follows:

- A 3 hour Multiple Choice Question (MCQ) paper of 120 questions consisting of one best answer out of four options
- A 2 hour Constructed Response Question (CRQ) Paper, in booklet format, consisting of 12 questions.

Standard Setting

The MCQ paper is standard set in advance using the Ebel method. The CRQ is standard set using the borderline candidate method. All questions are reviewed in the light of performance and modified accordingly.

Overall Result

To pass the Part 1 FRCOphth examination, candidates are required to pass both components (MCQ and CRQ) although some degree of cross compensation is permitted as outlined below. If awarded a fail, candidates must re-sit the entire examination, even if a pass was previously achieved in any component.

Cross Compensation

If a candidate marginally fails one written paper (within one standard error of measurement of the pass mark), their total marks for both papers will be added together. If this mark exceeds the combined pass marks for both papers, they will be allowed to pass the examination.

Results

Results will be released approximately four weeks after the examination, once verified by the Senior Examiner. Candidates are not permitted to telephone the College for examination results. All results will be sent to candidates by first class post and the pass list will be displayed on the College website.

Part 1 FRCOphth Examination Syllabus

The Fellowship of the Royal College of Ophthalmologists examinations are designed to assess the knowledge, skills and professional attitudes required of a doctor who wishes to practice as an ophthalmologist in the United Kingdom. A pass in the Part 1 FRCOphth, Refraction Certificate and Part 2 FRCOphth examinations represents a high level of achievement. The FRCOphth is a necessary but insufficient requirement for the Certificate of Completion for Training in Ophthalmology.

The three examinations that comprise the FRCOphth are based upon the curriculum for ophthalmic specialist training and candidates are **strongly advised to become familiar with the curriculum** (available at: http://curriculum.rcophth.ac.uk/).

The Part 1 FRCOphth examination assesses understanding of patient investigations and knowledge of basic and clinical sciences relevant to ophthalmology. The specific learning outcomes from the RCOphth OST curriculum that the examination assesses are:

Basic and clinical sciences

BCS1 Anatomy

All trainees must understand and apply knowledge of the anatomy of the eye, adnexae, visual pathways and associated aspects of head, neck and neuro anatomy. It extends to applied anatomy relevant to clinical methods of assessment and investigation relevant to ophthalmic practice. They must be able to use this knowledge when interpreting clinical investigations and in the practice of ophthalmic surgery.

The Orbit and adnexae: Osteology, orbital foramina, eyelids, conjunctiva, lacrimal system, extraocular muscles, intraorbital nerves, vessels, orbital fascia

Ocular anatomy: Conjunctiva, cornea, sclera, limbus and anterior chamber angle, iris and pupil, lens and zonule, ciliary body, choroid, retina, vitreous, optic nerve

The Cranial Cavity: Osteology of the skull, meninges, vascular supply, foramina, cranial fossae, pituitary gland and its relations

Central Nervous System: Cerebral hemispheres and cerebellum including microscopic anatomy of visual cortex, cranial nerves, spinal cord, vascular supply, visual pathways, control of eye movement, autonomic regulation of eye.

Head and neck: Nose, mouth, paranasal sinuses, face and scalp, pharynx, soft palate, larynx, trachea, major arteries and veins, lymphatic drainage of the head and neck

Cardiovascular system: Gross anatomy of the heart, and major blood vessels. Microscopic anatomy of arteries, veins and capillaries

BCS2 Physiology

All trainees must understand and apply knowledge of the physiology of the eye, adnexae and nervous system, including related general physiology. This includes the applied physiology relevant to clinical methods of assessment in ophthalmic practice. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

General principles including:

Maintenance of homeostasis: Characteristics of control systems - nervous and hormonal
Body fluids - volume, osmolarity, osmotic and oncotic pressure, and electrolyte (including H+) concentrations

Excitable tissues – nerve and muscle: Structure and function of nerve cell, membrane potential, action potential, nerve conduction, synapse, the motor unit, muscle

Blood: Plasma composition and functions, cell types, immune mechanisms, blood groups, haemoglobin and red and white cell formation and destruction, anaemias, clotting and fibrinolysis

Cardiovascular system: Pressure resistance and flow in blood vessels, blood pressure And blood flow, the activity of the heart and its control, cardiac output, control Mechanisms within the CVS, transcapillary exchange, tissue fluid formation

Respiratory system: Structure, lung volumes, composition of respiratory gases, lung mechanics, gas exchange in the lung, carriage of O_2 and CO_2 in blood, ventilation perfusion relationships, chemical and neural control of ventilation

Nervous system and special senses: Receptors, synapses, afferent pathways, efferent pathways, cerebral cortex, control of movement, hearing, pain and its control, autonomic nervous system, cholinergic transmission, adrenergic transmission

Endocrinology: Hormonal control, hypothalamus, pituitary, thyroid / parathyroid, adrenals, pancreas

Nutrition: Dietary requirements, absorption, vitamins

Kidney and adrenal cortex: Glomerular and tubular function, osmolality and pH of body fluids

Ocular physiology including:

Physiology of tear production and control and the lacrimal drainage system
Physiology of aqueous production and drainage including principles of intraocular pressure measurement
Physiology and biochemistry of the cornea
Lens metabolism
Physiology of the vitreous
Retinal physiology including phototransduction
Retinal pigment epithelium
Choroid
Blood ocular barrier

Physiology of vision including:

Visual acuity
Accommodation
Pupillary reflexes
Light detection
Dark adaptation
Colour vision
Electrophysiology of the visual system
Visual fields
Contrast sensitivity
Eye movements
Stereopsis
Motion detection
Visual perception
Magnocellular and parvocellular pathways

BCS3 Biochemistry and cell biology

All trainees must understand and apply knowledge of the basic biochemistry and cell biology. This includes in particular those aspects relevant to common eye diseases. They must be able to use this knowledge when interpreting clinical symptoms, signs and laboratory investigations and in the practice of ophthalmic medicine and surgery.

Biochemistry of the cell: Organelles, plasma membranes, cytoskeleton, nucleus (DNA, RNA), transport mechanisms, cell-cell communications, cell-matrix interactions

Signalling: Growth factors, cytokines, hormones, eicosanoids, receptors, signal transduction, intracellular signalling pathways (e.g. second messengers)

Cellular processes: Cell cycle, protein synthesis (transcription, translation, post-translational modification), nucleic acid synthesis, proliferation, migration, apoptosis, metabolic processes

Connective tissue and extracellular matrix: Extracellular matrix molecules, composition of ocular extracellular matrices, synthesis/degradation, cell-matrix interactions

Biochemical and molecular biological techniques: Examples include: gene cloning, polymerase chain reaction, in-situ hybridisation, immuno-localisation, ELISA assays, Western, Northern and Southern blotting.

Biochemistry and cell biology of ocular tissues: Cornea, sclera, ciliary body, lens, vitreous, retina, choroid.

Active oxygen species: Free radicals and H_2O, scavengers, lipid peroxidation, phospholipase A

BCS4 Pathology

All trainees must understand and apply knowledge of pathology, especially the specialist pathology of the eye, adnexae and visual system. This includes histopathology, microbiology and immunology and other branches of pathology. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

Acute inflammation: Chemical mediators, cellular mechanisms
Wound healing
Chronic inflammation: Types, granulomata, immune mechanisms, ulceration, specific examples

Immunological mechanisms: Types of hypersensitivity reaction
Graft rejection
Degenerations: Examples: amyloidosis, calcification
Ageing and atrophy
Hypertrophy, hyperplasia and metaplasia
Vascular disorders: Atheroma, thrombosis (and homeostatic clotting mechanisms embolism (including pulmonary embolism), ischaemia and infarction, congestion and oedema, angiogenesis, hypertension, aneurysms, diabetic microangiopathy
Shock
Neoplasia: Definition, terminology, concepts; benign and malignant tumours; carcinogenesis; gene control – including regulation of apoptosis; oncogenes; geographical and environmental factors; pre-neoplastic conditions; effects of irradiation and cytotoxic drugs

BASIC OCULAR PATHOLOGY
With an emphasis on:
Cornea endothelial dysfunction and corneal dystrophies
Glaucoma
Cataract
Diabetes
Age Related Macular Degeneration
Retinal vascular occlusion
Ocular neoplasia
Retinal detachment and Proliferative Vitreo-retinopathy

MICROBIOLOGY:
The biological and clinical behaviour of the micro-organisms responsible for infections
Elementary principles of microbial pathogenesis: Concepts of colonisation, invasion, endotoxins, exotoxins, virulence and pathogenicity etc.
Gram staining and classification
Commensal eye flora
Viruses: Classification, structure and replication, antiviral agents, laboratory methods of viral detection; viral infections of the eye.
Prions
HIV and AIDS
Fungi: Classification, factors which predispose to fungal infection, antifungal agents.
Toxoplasmosis, Chlamydia, Acanthamoeba, helminthic infections
Principles of sterilization: Disinfection and asepsis and the application of these to current practice and practical procedures
Antimicrobials: Spectrum of activity, mode of action, pharmacokinetics and resistance

IMMUNOLOGY

Principles of immunology e.g. non-specific resistance, genetic basis of immunity, cellular and humoral mechanisms
Host defence mechanisms with particular reference to the eye
Mechanisms of immunologically-induced tissue damage with special reference to the eye
Role of soluble mediators (cytokines and chemokines) in regulation of inflammatory responses
MHC antigens, antigen presenting cells and antigen processing
Transplantation immunology (with particular reference to the cornea)
Immunodeficiency and immunosuppression
Tissue regulation (with particular reference to the eye) of inflammatory responses)

BCS5 Growth and senescence

All trainees must understand and apply knowledge of growth, development and senescence, and the anatomical, physiological and developmental changes which occur during embryogenesis, childhood and ageing relevant to ophthalmic practice. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

Embryology: General embryology especially at early stages; embryology of the eye, orbit, adnexae and visual pathways; the embryological origins of congenital malformations of the eye.

Child development: key milestones in childhood development especially regarding the visual and central nervous systems.

Senescence: the process of ageing and degeneration.

BCS6 Optics

All trainees must understand and apply knowledge of optics, ultrasound and electromagnetic wavelengths relevant to ophthalmic practice. They must have a basic understanding of medical physics. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

PHYSICAL AND GEOMETRIC OPTICS:

Properties of light: Electromagnetic spectrum, wave theory, particle theory, diffraction, interference, resolution, polarisation, scattering, transmission and absorption, photometry, lasers

Reflection: Laws of reflection, reflection at a plane surface, reflection at curved surfaces

Refraction: Laws of refraction (Snell's Law), refraction at a plane surface, refraction at curved surfaces, critical angle and total internal reflection

Prisms: Definition, notation of prisms, uses in ophthalmology (diagnostic and therapeutic), types of prism

Spherical lenses: Cardinal points, thin lens formula, thick lens formula, formation of the image, vergence power (dioptric power), magnification, spherical decentration and prism power, lens form

Astigmatic lenses: Cylindrical lenses, Maddox rod, toric lenses, Conoid of Sturm, Jackson's cross cylinder

Notation of lenses: Spectacle prescribing, simple transposition, toric transposition

Identification of unknown lenses: Neutralisation, focimeter, Geneva lens measure

Aberrations of lenses: Correction of aberrations relevant to the eye, Duochrome test

CLINICAL OPTICS

Optics of the eye: Transmittance of light by the optic media, schematic and reduced eye, Stiles-Crawford effect, visual acuity, contrast sensitivity, catoptric images, emmetropia, accommodation, Purkinje shift, pinhole.

Ametropia: Myopia, hypermetropia, astigmatism, anisometropia, aniseikonia, aphakia

Accommodative problems: Insufficiency, excess, AC/A ratio

Refractive errors: Prevalence, inheritance, changes with age, surgically induced

Correction of ametropia: Spectacle lenses, contact lenses, intraocular lenses, principles of refractive surgery

Problems of spectacles in aphakia: Effect of spectacles and contact lens correction on accommodation and convergence, effective power of lenses, back vertex distance, spectacle magnification, calculation of intraocular lens power, presbyopia

Low visual aids: High reading addition, magnifying lenses, telescopic aids - Galilean telescope

BCS8 Therapeutics

All trainees must understand and apply knowledge of clinical therapeutics relevant to ophthalmic practice. They must be able to use this knowledge when prescribing for a patient. They must understand the therapeutics used in general medicine and surgery to a basic standard. They must be aware of the possible ocular effects of systemic medications and systemic effects of ocular medications.

PHARMACOLOGY

Pharmacokinetics and pharmacodynamics: General and specific to ocular tissues

Drug-receptor interactions

Mechanisms of drug actions (including receptor pharmacology and biochemical pharmacology)

Mechanisms of drug toxicity

Specific classes of pharmacological agents: Examples include catechol aminergics, cholinergics, serotonergics and histaminergics, eicosanoids

Pharmacology of drugs used in inflammation and immunosuppression

Pharmacology of drugs used in glaucoma

Local anaesthetics

Analgesics

BCS 12 Lasers

All trainees must understand and apply knowledge of lasers relevant to ophthalmic practice. They must be able to use this knowledge when recommending laser treatment in the practice of ophthalmic medicine and surgery. They must be fully versed in local laser safety procedures.

The physics of light and lasers: coherence, laser physics, laser properties, types of ophthalmic laser, tissue effects of laser, photocoagulation, photoablation, photodisruption, drug-enhanced laser absorption, OCT

BCS13 Epidemiology and evidence based medicine

All trainees must understand and apply knowledge of clinical epidemiology and evidence based medicine relevant to ophthalmic practice. They must be able to use this knowledge during clinical assessment, interpreting investigations and planning clinical management for a patient.

Scientific method: clinical measurement instruments, reliability and scales, definition of epidemiological terms, definition of blindness, main causes throughout world,

Screening for ocular disease: principles of screening, evaluation of screening programmes, sensitivity and specificity

Evidence based practice: hierarchy of evidence, trial design, sources of information, interpretation of evidence

BCS14 Instrument technology

All trainees must understand and apply knowledge of instrument technology relevant to ophthalmic practice. They must be aware of the limitations of technology and the risks involved in their use. They must be able to maintain an understanding of new developments in relevant technologies.

Direct and indirect ophthalmoscopes
Retinoscope
Focimeter
Simple magnifying glass (Loupe)
Lensmeter
Automated refractor
Slit-lamp microscope
Applanation tomography and tonometry
Keratometer
Specular microscope
Operating microscope
Zoom lens principle
Corneal pachometer
Lenses used for fundus biomicroscopy (panfunduscope, gonioscope Goldmann lens, Hruby lens, 90D lens, etc.)
Fundus camera
Lasers
Fields machines (Goldmann, Humphrey)
Retinal and optic nerve imaging devices (OCT, SLO, GDx)

BCS15 Biostatistics

All trainees must understand and apply knowledge of statistics relevant to ophthalmic practice. They must be able to use this knowledge in the interpretation and publication of research.

Basic descriptive and inferential statistics

Statistical tests: Choice of test, parametric vs. nonparametric, sensitivity, specificity, predictive values, odds ratio, likelihood ratio, correlation and regression.

Clinical study design: Types, stages of clinical studies, bias, errors, randomisation, power, sample size calculation, confidence intervals, P-values, reliability and validity)

BCS16 Clinical Genetics

All trainees must understand and apply knowledge of clinical genetics relevant to ophthalmic practice. They must be able to use this knowledge when advising patients about patterns of inheritance. They must recognise when it is appropriate to refer a patient for genetic counselling. They must recognise when it is important to offer a consultation with family members.

Organisation of the genome: Genes, chromosomes, regulation of transcription

Mendelian genetics: General principles

Population genetics: General principles

Cytogenetics: Aneuploidy, deletions, translocations, mosaicism, chimerism

Genetic basis of eye conditions: Genes involved in ocular disorders or systemic disorders with an ocular phenotype

Investigative and research techniques: Linkage analysis, candidate genes, twin studies, association studies

Gene therapy: General principles

Patient Investigations (PI):

Candidates are expected to understand the basic principles underlying these investigations, when to order them and how the results should be interpreted.

PI1 Orthoptic assessment

All trainees must be able to refer for an orthoptic assessment, where appropriate, and interpret the findings. They must understand the limitations of the investigations and the implications of positive or negative test results. They must be aware of the cost and resources involved.

Interpretation and an understanding of the performance underlying basic science of the tests that make up a typical orthoptic report, including:
Quantitative and qualitative assessment of vision
Cover-uncover test and alternate cover test
Assessment of ocular movements
Measurement of deviation
Assessment of fusion, suppression and stereoacuity.

PI2 Assessment of corneal shape, structure and thickness

All trainees must be able to order and interpret investigations to assess the cornea, although availability of equipment will vary in different units. They must be able to order and interpret basic tests. They must be able to interpret more complex investigations and be aware of specialised techniques. They must understand the purpose and limitations of the investigations and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to with the test as well as the cost and resources involved.

Interpretation and an understanding of the performance underlying basic science of contemporary tests that are used in corneal practice, including:
Keratometry
Corneal topography
Pachymetry

Optical coherence tomography
Specular and confocal microscopy
Wavefront analysis

PI3 Retinal and optic nerve imaging

All trainees must be able to order and interpret retinal and optic nerve investigations that require some form of image capture and analysis. They must be aware of new techniques as they are developed. They must understand the limitations of the investigations and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to involved with the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in retinal practice, including:
Retinal photography
Optical coherence tomography
Scanning laser ophthalmoscopy

PI4 Ocular angiography

All trainees must be able to order and interpret ocular angiograms. They must understand the purpose and limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to involved with the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary angiographic tests that are used in retinal practice, including:
Fluorescein and indocyanine green angiography

PI5 Ultrasonography

All trainees must be able to order and interpret appropriate ocular, orbital and other relevant ultrasound measurements and images. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress to which the patient may be exposed during the test as well as the cost and resources involved.

PI6 Radiology and other neuro-imaging

All trainees must be able to order and interpret appropriate radiological and related investigations. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance underlying basic science of contemporary tests that are used in radiological practice, of relevance to the practice of ophthalmology, including:
Plain skull and chest X ray
Orbital and neuro-CT scans
Orbital and neuro-MRI scans
Neuro-angiography

PI7 Ocular and neuro-physiology

All trainees must be able to order and interpret appropriate electrodiagnostic tests. They must understand the limitations of the investigation and the implications of a positive or negative test result.

They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including:
Electroretinography
Electrooculography
Visually evoked potentials

PI8 Biochemistry

All trainees must be able to order and interpret appropriate biochemical investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Liver and renal function tests
Blood glucose
Cardiac enzymes
Acid-base balance
Blood gases
Thyroid function tests

PI9 Haematology

All trainees must be able to order and interpret appropriate haematology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Clotting screens
Blood count
Blood transfusion
ESR. CRP and blood viscosity

PI10 Pathology

All trainees must be able to order and interpret appropriate pathology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

An understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Types of biopsy
Transport of specimens
The law in relation to human tissue

PI11 Microbiology

All trainees must be able to order and interpret appropriate microbiology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Collection of samples for virology, bacteriology, mycology, parasitology
Corneal scrapes
Conjunctival swabs
Intra-ocular samples

PI12 Biometry

All trainees must be able to order and interpret appropriate biometry investigations, particularly in relation to decision making in cataract surgery. They must understand the limitations of the investigation and the implications of an unusual result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Keratometry
Axial length measurement
IOL power calculation
And
A constants
Sources of biometric error
Choice of post-operative refractive error
Refractive error

PI13 Fields (automated, Goldmann)

All trainees must be able to order and interpret appropriate visual field investigations. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Humphrey and other automated perimeters
Statistical analysis
Goldmann perimetry

PI14 Immunology and allergy testing

All trainees must be able to order and interpret appropriate immunology and allergy investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including

Auto-antibodies
HLA antigens
Patch tests

PI15 Urinalysis

All trainees must be able to order and interpret appropriate urinalysis and recognise when further referral is required. They must understand the limitations of the investigation and the implications of a positive or negative test result.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Proteinuria
Haematuria

PI16 Bone scans

All trainees must know when it is appropriate to order bone scans as part of bone protection in long term steroid use. They must recognise when action is required based upon the report. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
Dexa-scans

Suggested reading list for Part 1 Fellowship Examination

This list is not designed to be exhaustive. Similarly, only some sections in these books are directly relevant to the Part 1 examination.

The Eye: Basic Sciences and Practice. Forrester JV, Dick AD, McMenamin P, Lee WR. WB Saunders 2003. ISBN: 0-7020-2541-0

MCQ companion to the Eye. Basic Sciences in Practice. Galloway PH, Forrester JV, Dick AD, Lee WR. WB Saunders 2001. ISBN: 0702025666

American Academy of Ophthalmologists. Basic and Clinical Science Course. ISBN: 1-56055-570-X
Volume 1. Update on general medicine.
Volume 2. Fundamentals and principles of ophthalmology
Volume 3. Optics, refraction and contact lenses
Volume 4. Ophthalmic pathology and intraocular tumours.

Adler's Physiology of the Eye. Ed. Hart WM. Mosby 2003. ISBN: 0-323-01136-5

Clinical Anatomy of the Eye. Snell RS, Lemp MA. Blackwell Scientific Publications 1998. ISBN: 063204344X

Clinically orientated anatomy. Moore KL, Dalley AF. Lippincott Williams and Wilkins 2005. ISBN: 0781736390.

Pathology for Surgeons in Training: An A-Z revision text. Gardner DL and Tweedle DEF. Arnold 2002. ISBN: 0340759046

Ocular Pathology, 5th ed. Yanoff M and Fine BS. Mosby 2002. ISBN: 0323014038

Medical Microbiology. Greenwood D, Slack R, Peutherer J. Churchill Livingstone 2002. ISBN 0443070776

Medical pharmacology at a glance. Neal MJ. Blackwell Publishing 2002. ISBN: 0632052449

Clinical Ocular Pharmacology. Jaanus SD, Barlett JD. Butterworth-Heinemann 2001. ISBN: 0750670398

Neuro-Ophthalmology. Glaser JS, 3rd edition, 1999. JB Lippincott Co, Philadelphia 1999. ISBN: 0781717299.

Genetics for Ophthalmologists: The molecular genetic basis of ophthalmic disorders. Black GCM. Remedica Publishing 2002. ISBN: 190134620X

Biochemistry of the eye. Whikehart R. Butterworth-Heinemann 2003. ISBN: 0750671521

Clinical optics. Elkington AR, Frank HJ and Greaney MJ. Blackwell Science. ISBN: 0632049898