

# Examination Information Pack

## Part 1 FRCOphth Examination



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
- Candidate code of conduct
- Policy on Allegations of Cheating in Examinations
- Appeals Procedure
- Language Requirements
- Preparing for Examinations
- Examination Timetable
- Examination Structure
- Standard Setting
- Examination Syllabus
- Reading List

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

Dylan Costello  
**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 **eight weeks** 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 seven 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 pencils, rulers 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 or other electronic equipment including smart watches. All devices **must be switched off and must not 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 (including passports) 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

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.

An examination can be taken before the candidate enters the relevant GMC-approved training programme or when they are on a break in the programme.

The pass will be considered current as long as the candidate enters or re-enters the programme within seven years of passing the examination and satisfies any other currency requirements.

A pass in an examination taken after completing a run-through or higher training programme will not be acceptable for a certificate of completion of training. In that situation, doctors may be able to demonstrate equivalence via the CESR or CEGPR process.

## **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 (candidate must have been aged 18 or over at the time of assessment)
- A statement of Special Educational Needs
- A relevant diagnostic report regarding the learning disability
- Historical evidence of the disability

### Extra time award:

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.

### Specialist equipment:

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.

## **CODE OF CONDUCT FOR EXAMINATION APPLICANTS AND CANDIDATES**

The College's code of conduct can be found on our website, at the following link:

<https://www.rcophth.ac.uk/wp-content/uploads/2014/11/Code-of-Conduct-Examination-candidates-and-applicants-20170404.pdf>

## **ALLEGATIONS OF CHEATING AND MISCONDUCT IN EXAMINATIONS**

Further information regarding the College's Policy on Allegations of Cheating and Misconduct in Examinations can be found on our website, at the following link:

<https://www.rcophth.ac.uk/wp-content/uploads/2014/11/Policy-on-Allegations-of-Cheating-and-Misconduct-20171101.pdf>

## **Appeals Procedure**

The College's appeal procedure is available online at [www.rcophth.ac.uk/examinations/appeals-procedure/](http://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 as 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/>)



**THE ROYAL COLLEGE OF OPHTHALMOLOGISTS**

**PART 1 FRCOPHTH EXAMINATION**

**TIMETABLE 2018**

**January 2018**

<b>Examination Date:</b>	<b>Monday 15 January 2018</b>
<b>Opening Date for Receipt of Applications:</b>	<b>Monday 25 September 2017</b>
<b>Closing Date for Receipt of Applications:</b>	<b>Monday 20 November 2017</b>

**May 2018**

<b>Examination Date:</b>	<b>Tuesday 8 May 2018</b>
<b>Opening Date for Receipt of Applications:</b>	<b>Monday 15 January 2018</b>
<b>Closing Date for Receipt of Applications:</b>	<b>Monday 12 March 2018</b>

**October 2018**

<b>Examination Date:</b>	<b>Monday 1 October 2018</b>
<b>Opening Date for Receipt of Applications:</b>	<b>Monday 11 June 2018</b>
<b>Closing Date for Receipt of Applications:</b>	<b>Monday 6 August 2018</b>

**Examination Venues:**

- London
- Glasgow
- Sheffield
- Dublin
- 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 three hour Multiple Choice Question (MCQ) paper of 120 questions consisting of single best answer from four options
- A two 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](#)

**Understand and apply knowledge of the anatomy of the eye, adnexae, visual pathways and associated aspects of head, neck and neuro anatomy**

**Understand applied anatomy relevant to clinical methods of assessment and investigation used in ophthalmic clinical and surgical practice.**

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](#)

**Understand and apply knowledge of the physiology of the eye, adnexae and nervous system, including related general physiology.**

**Understand the applied physiology relevant to clinical methods of assessment in ophthalmic practice.**

**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<sup>+</sup>) 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<sub>2</sub> and CO<sub>2</sub> 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](#)

**Understand and apply knowledge of the basic biochemistry and cell biology, in particular those aspects relevant to common eye diseases.**

**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<sub>2</sub>O, scavengers, lipid peroxidation, phospholipase A

## BCS4 [Pathology](#)

**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.**

**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](#)

**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.**

**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](#)

**Understand and apply knowledge of optics, ultrasound and electromagnetic wavelengths relevant to ophthalmic practice.**

**Acquire a basic understanding of medical physics.**

**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](#)**

**Understand and apply knowledge of clinical therapeutics relevant to ophthalmic practice.**

**Use this knowledge when prescribing for a patient.**

**Understand the therapeutics used in general medicine and surgery to a basic standard.**

**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](#)**

**Understand and apply knowledge of lasers relevant to ophthalmic practice.**

**Use this knowledge when recommending laser treatment in the practice of ophthalmic medicine and surgery.**

**Comply with 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](#)

**Understand and apply knowledge of clinical epidemiology and evidence based medicine relevant to ophthalmic practice.**

**Use this knowledge during clinical assessment, interpreting investigations and planning clinical management for a patient.**

**Be aware of the influence of economic and political considerations (on a local and global scale) on individual and community health and how these may be influenced.**

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](#)

**Understand and apply knowledge of instrument technology relevant to ophthalmic practice.**

**Be aware of the limitations of technology and the risks involved in their use.**

**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](#)

**Understand and apply knowledge of statistics relevant to ophthalmic practice.**

**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](#)

**Understand and apply knowledge of clinical genetics relevant to ophthalmic practice.  
Use this knowledge when advising patients about patterns of inheritance.  
Recognise when it is appropriate to refer a patient for genetic counselling.  
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](#)**

**Know the relevant investigations and when to request them.  
Explain the benefits, risks and potential discomfort to the patient/carer.  
Be able to interpret, explain and act upon the results.  
Know the limitations and cost implication of each investigation.**

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](#)**

**Know the relevant investigations for the assessment of the anterior segment and corneal shape, structure and thickness.  
Be aware of new, specialised techniques, as they develop.  
Know how and when (urgent vs routine) to request them.  
Explain the benefits, risks and potential discomfort to the patient/carer.  
Be able to interpret, explain and act upon the results.  
Know the limitations and cost implication of each investigation.**

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](#)

**Know the relevant investigations and be aware of new and specialised techniques as they develop.**  
**Know how and when (urgent vs routine) to request them.**  
**Explain the benefits, risks and potential discomfort to the patient/carer.**  
**Be able to interpret, explain and act upon the results.**  
**Know the limitations and cost implication of each investigation.**

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](#)

**Know the relevant investigations.**  
**Know how and when (urgent vs routine) to request them.**  
**Explain the benefits, risks and potential discomfort to the patient/carer.**  
**Be able to interpret, explain and act upon the results.**  
**Know the limitations and cost implication of each investigation.**

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](#)

**Know the relevant investigations including ocular, orbital and other relevant ultrasound images and measurements.**  
**Know how and when (urgent vs routine) to request them.**  
**Use with accuracy & efficiency the instruments available to you.**  
**Explain the benefits, risks and potential discomfort to the patient/carer.**  
**Know the limitations and cost implication of each investigation.**

**PI6**    [Radiology and other neuro-imaging](#)

**Know the relevant investigations and their contra-indications.**  
**Know how and when (urgent vs routine) to request them**  
**Explain the benefits, risks and potential discomfort to the patient/carer**  
**Be able to interpret, explain and act upon the results**  
**Know the limitations and cost implication of each investigation.**

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](#)

**Know the relevant investigations including ocular and neuro-electrophysiology.**

**Know how and when (urgent vs routine) to request them.**

**Explain the benefits, risks and potential discomfort to the patient/carer.**

**Be able to interpret, explain and act upon the results**

**Know the limitations and cost implication of each investigation.**

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](#)

**Know the relevant haematological, and biochemical investigations.**

**Know how and when (urgent vs routine) to request them.**

**Interpret, explain and act upon the results.**

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](#)

**Know the relevant haematological, and biochemical investigations.**

**Know how and when (urgent vs routine) to request them.**

**Interpret, explain and act upon the results.**

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](#)

**Know the relevant investigations.**

**Know how and when (urgent vs routine) to request them.**

**Know how to prepare and transport a sample or biopsy.**

**Interpret, explain and act upon the results.**

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](#)

**Know the relevant investigations.**

**Know how and when (urgent vs routine) to request them.**

**Know how to take and transport a sample or tissue scrape, including use of optimal transport medium to isolate the causative organism.**

**Interpret, explain and act upon the results.**

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](#)

**Know the relevant investigations in particular for cataract surgery.**

**Recognise an error in the biometry result and identify when it may need to be repeated.**

**Know how and when to request contact and non-contact biometry.**

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 \(automated, Goldmann\)](#)

**Know the different perimeters available and the different strategies and algorithms used for measuring visual field.**

**Choose appropriate strategies for different conditions e.g. glaucoma monitoring, neurological assessment, driving standards.**

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](#)

**Know the relevant immunological investigations.**

**Know how and when (urgent vs routine) to request them.**

**Interpret, explain and act upon the results.**

**Know about allergy testing such as the patch test.**

**Understand the use of immunological tests in patients on immunosuppressive treatment.**

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

**PI16** [Bone scans](#)

**Know the relevant investigations.**

**Know how and when to request them, especially for long-term steroid use to guide bone protection management.**

**Interpret, explain and act upon the results.**

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, McMenemy 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, 5<sup>th</sup> 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. Whitehart R. Butterworth-Heinemann 2003. ISBN: 0750671521

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