

# Optometry and vision sciences

## Vision sciences and optics

The Department of Optometry and Vision Sciences provides a series of subjects in vision and optical science to BSc, BASc and BSc combined degree students that will lead to a major in vision sciences. Vision science is the study of the eye, vision and optics. There are eleven vision sciences subjects, all aiming to provide students with a thorough knowledge of the eye and visual performance together with an understanding of the physiological processes underlying vision. The three subjects in optical science aim to provide an understanding of optical systems and the ability to analyse the performance of optical systems, as well as the ability to develop designs for optical systems to specified performance criteria.

The subjects available to science students are:

- 655-111 Vision: How The Eye Sees The World (p.1)
- 655-152 Optics: From Rainbows to Digital Imaging (p.1)
- 655-201 Anatomy & Histology of the Eye (p.1)
- 655-210 Optical Design and Ophthalmic Metrology (p.2)
- 655-221 Human Visual Functions (p.2)
- 655-222 Visual Processing and Control (p.2)
- 655-321 Practical Problems in Vision (p.2)
- 655-328 Visual Neuroscience (p.2)
- 655-341 Ocular Histopathology (p.3)
- 655-351 Ophthalmic Lenses and Dispensing (p.3)
- 655-359 Ophthalmic Lenses and Optical Dispensing (p.3)
- 600-311 Research Project A (p.1)
- 600-312 Research Project B (p.1)

All the subjects are 12.5 points.

BSc students who have completed the recommended subjects in visual and optical sciences and gain entry into the Bachelor of Optometry course may be given credit for the equivalent subjects within the optometry degree. Successful applicants, providing their previous subjects taken are equivalent to the first year of the optometry course, would be entering into the second year of the course. BSc (Honours) degree students who have passes in the BSc optics and vision science subjects offered, may qualify for entry into the third year of the optometry course.

## Bachelor of Optometry

The Department of Optometry and Vision Sciences is responsible for the five-year course leading to the degree Bachelor of Optometry. Optometry is a professional discipline based on the optical and visual sciences. The practice of optometry involves the diagnosis and treatment of functional disorders and diseases of the eye and vision: the optometrist's job is to solve patients' visual problems. The full list of subjects in the Bachelor of Optometry course is given on page 30.

## Bachelor of Science (Degree with Honours)

For information about the faculty and departmental requirements for honours, please refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*. These requirements should be considered when planning your course.

## Further information

Department of Optometry and Vision Sciences  
The University of Melbourne  
Cnr Keppel and Cardigan Streets  
Carlton 3053  
Tel: +61 3 9349 7408  
Fax: +61 3 9349 7498  
Web: <http://www.optometry.unimelb.edu.au>

## Optometry and vision sciences subject descriptions

The following subjects are available to BSc, BASc and BSc combined degree students.

### 100-level subjects

#### 655-111 Vision: How The Eye Sees The World

**Credit points:** 12.5

**Coordinator:** Dr A Metha

**Contact:** 36 hours of lectures/tutorials and 18 hours of practical/computer assisted learning sessions (*Semester 1*).

**Description:** This subject aims to provide a primary understanding of basic vision functions and visual perception. Topics to be covered include light, its measurement and quantification, the transmission characteristics of the eye and perceptual attributes; basic anatomy of the eye and visual pathways as they relate to visual perception and refractive error (near-sightedness, far-sightedness and astigmatism); detailed anatomy of the orbit, and orbital contents, including the extra-ocular muscles and their actions; comparative anatomy and physiology discussing how human eyes are at the same time both similar and dissimilar to those of other species with regard to general structure, colour vision, visual acuity and accommodation; experimental approaches used to measure sensory modalities; fundamental attributes of our monocular processes such as the perception of colour, temporal (flicker) vision, form (spatial) vision and the space sense; and basic binocular function including the perception of depth and stereopsis. You will learn what 20/20 vision means and why we perceive depth with the 'magic eye' pictures. Congenital and acquired visual anomalies will be used throughout the course to illustrate visual dysfunction.

**Assessment:** Two 30-minute multiple-choice tests held during the semester (5% each); six practical report sheets submitted at the end of each practical (15% total); a 2-hour written examination in the examination period (75%).

**Recommended texts:** S H Schwartz, *Visual Perception: A Clinical Orientation*, 2nd edn, Appelton and Lange, 1994. • E B Goldstein, *Sensation and Perception*, Wadsworth-Thompson Learning, 2002.

#### 655-152 Optics: From Rainbows to Digital Imaging

**Note:** Students may only gain credit for one of 655-152 or 655-101, 655-102 or 655-202 (prior to 2005).

**Credit points:** 12.5

**Coordinator:** Dr L Abel; Dr A Metha

**Prerequisites:** Nil.

**Contact:** 30 1-hour lectures, 6 1-hour tutorials, 6 3-hour practical classes and 12 1-hour multimedia classes (*Semester 2*).

**Description:** This subject introduces students to the concept of light as waves of electromagnetic energy radiation; how it is generated and measured, how this energy propagates through space over time, and how optical elements are used to bend and otherwise manipulate light to achieve important real-world applications. Students will have the opportunity to gain appreciation of light transmission through optical fibres, leading to a discourse covering the field of optical communications. The fundamentals of light refraction and optical systems will be introduced and developed in lectures and by interactive web-based multimedia modules. By participating in the laboratory exercises, students will be offered the opportunity to gain practical skills and a solid understanding of optical imaging which forms the basis of modern digital camera systems. Digital image capture and image compression technologies will be covered, as will both old and new display technologies including virtual reality systems using LCD and plasma screens. The subject covers the latest approaches to high resolution imaging problems including the use of confocal microscopy systems for 3D imaging of biological samples. The fast-growing field of adaptive optics is introduced in the context of improving astronomical telescope observation and also as the latest technologies to correct the eye's optical imperfections, including modern contact lens design and laser-surgical therapy approaches.

**Assessment:** Practical assignments due during semester (20%); two multiple-choice tests held during the semester (7.5% each); a 3-hour written examination in the examination period (65%).

**Recommended texts:** G Smith and D A Atchison, *The Eye and Visual Optical Instruments*, Cambridge University Press, 1997. • M H Freeman and C C Hull, *Optics*, Butterworth-Heinemann (ed. 11), 2004. • D S Falk, D R Brill and D G Stork, *Seeing the Light: optics in nature, photography, color, vision, and holography*, Harper & Row, New York, 1986.

### 200-level subjects

#### 655-201 Anatomy & Histology of the Eye

**Note:** Credit cannot be obtained for both 655-201 and 655-211 (prior to 2004).

**Credit points:** 12.5

**Coordinator:** Ms A Jaworski

**Prerequisites:** Biology 650-141 and 650-142 (prior to 2004: 600-141 and 600-142).

**Contact:** 32 lectures/reviews and 24 hours of practical and tutorial classes (*Semester 1*).

**Description:** This subject covers the detailed anatomy and histology of the eye, orbit and visual pathways. Upon completion of this subject students should comprehend the terminology of histology and cytology; be able to identify and interpret the light and electron microscopic appearance of cells

and tissues; the histology of the eye, orbit and visual pathways; the embryological development of the eye; and the neuroanatomy of the visual pathways. The initial lectures will provide an introduction to histology and will then form the knowledge basis for the subsequent lectures and practicals addressing the detailed topographical and ultrastructural anatomy of the orbit, eye and visual pathway.

At the end of this subject, students should have a firm foundation of the gross, ultrastructural and histological structure of the eye, orbit and visual pathway. This knowledge will enable students to appreciate normal ocular anatomy and how ocular structures are altered during disease. Students should also

- develop the communication skills (written and oral) necessary to describe the structures of the eye;
- be able to describe ocular structure using a range of techniques;
- understand the importance of one's own observations and the scientific basis of knowledge about ocular histology; and
- appreciate the need for continuing independent learning and the importance of keeping pace with future advances.

**Assessment:** Ongoing assessment of practical work during the semester (20%); a 2-hour written examination in the examination period (80%).

**Prescribed texts:** A J Bron, R C Tripathi and B J Tripathi, *Wolff's Anatomy of the Eye and Orbit*, 8th edn, Chapman and Hall, 1997 (or later edition).

### 655-210 Optical Design and Ophthalmic Metrology

**Note:** Students may only gain credit for one of 655-210 or 655-219 or 655-311 (prior to 2006).

**Credit points:** 12.5

**Coordinator:** Dr A Anderson

**Prerequisites:** One of Optometry 655-152, 655-101, 655-102 or 655-202.

**Contact:** 36 lectures (three per week) and 24 hours of practical work/ computer-aided learning (CAL) (*Semester 2*).

**Description:** The purpose of this subject is to provide an understanding of the principles and techniques of optical design including an understanding of the control and optimisation of aberrations. It is an introduction to ophthalmic lenses and spectacle lens design. The topics covered include aberration theory, optical design and control of aberrations including the design of ophthalmic lenses, advanced photometry and radiometry, and optics of commonly used ophthalmic instruments. Practical classes will include computer-aided tutorials on both optical design and lens calculations.

**Assessment:** Ongoing assessment of practical work during the semester (15%); a calculation-based group assignment due at the end of the semester (10%); a 3-hour written examination in the examination period (75%). Satisfactory completion of all assessment components is necessary to pass the subject.

**Prescribed texts:** G Smith and D A Atchison, *The Eye and Visual Optical Instruments*, Cambridge University Press, 1997.

### 655-221 Human Visual Functions

**Credit points:** 12.5

**Coordinator:** A/Prof T Vidyasagar

**Prerequisites:** 655-111 Vision: How The Eye Sees The World (*p.1*). A 100-level mathematics subject is recommended, but not a prerequisite.

**Contact:** 24 lectures/tutorials and 21 hours of practical work (*Semester 1*).

**Description:** This subject gives a detailed account of the capabilities of the human visual system and an introduction to theories of visual function. Experience is gained in the laboratory classes in measuring visual functions and in using classical visual psychophysical methodology. The topics covered are the light sense, including spectral sensitivity, light and dark adaptation and mechanisms of adaptation; the colour sense, including a detailed account of colour processing that will form the basis for understanding of colour deficiencies; temporal resolution and movement perception; and the form sense including visual acuity and the contrast sensitivity function.

**Assessment:** Ongoing assessment of practical work during the semester (20%); a 30-minute written examination held mid-semester (10%); a 3-hour written examination in the examination period (70%). Satisfactory completion of the practical work is necessary to pass the subject.

**Prescribed texts:** T T Norton, D A Corliss, J E Bailey, *The Psychophysical Measurement of Visual Function*, Elsevier Health Sciences, 2003 (or later edition).

**Recommended texts:** P L Kaufman, A Alm (eds), *Adler's Physiology of the Eye, Clinical Applications*, 10th edn, Mosby 2003 (or later edition).

### 655-222 Visual Processing and Control

**Credit points:** 12.5

**Coordinator:** Dr L Abel

**Prerequisites:** 655-221.

**Contact:** 24 lectures (two per week) plus seven 3-hour practicals (*Semester 2*).

**Description:** This series of lectures will deal with the structure and function of the visual system, essential for a fundamental understanding of the rationale of many types of measurements and observations undertaken in evaluating visual function. The subject begins with the neural control of gaze and follows up with a full account of normal and abnormal eye movements. The subject deals with muscular mechanisms of the eye including the mechanics of translatory, saccadic and slow pursuit eye movements, Listing's Law, neural control of eye movements and binocular eye movements, Hering's Law, accommodation and the accommodative-convergence synkinesis and pupillary reactions. There will be lectures on the use of electrical recordings from the eye to help understand ocular function. The subject will also include a detailed account of the visual space sense, including binocular correspondence, the horopter, fusion and stereopsis.

**Assessment:** Ongoing assessment of practical work during the semester (20%); a 30-minute written examination held mid-semester (10%); a 3-hour written examination in the examination period (70%). Satisfactory completion of practical work is necessary to pass the subject.

**Prescribed texts:** E R Kandel, J H Schwartz, T M Jessell, *Principles of Neural Science*, 4th edn, McGraw-Hill, 2000.

## 300-level subjects

### 655-321 Practical Problems in Vision

**Credit points:** 12.5

**Coordinator:** A/Prof T Vidyasagar

**Prerequisites:** 655-221, 655-222 and 655-028.

**Contact:** A 1-hour introductory lecture, 8 hours of seminars and 5 hours of tutorials, plus guided study and research equivalent to 3 hours per week (*Semester 2*).

**Description:** The subject is presented in a problem-oriented approach and is therefore designed to provide students with an opportunity to use their basic knowledge of the visual system to solve clinical or other relevant vision problems. It would develop students' skills in reading, analysing and debating scientific papers in the vision sciences.

Students will be divided into groups of 5 to 7 and each group will be provided with the scenario of a clinical case or of an experimental situation, and working in a group they will be solving it by discussing the problem among themselves, performing extensive literature search through library resources and if necessary, even performing some minor experiments. Each scenario is set by and coordinated by an assigned academic staff member. The academic will guide the students at the beginning and at tutorials during the semester. Towards the end of the semester, each group will present a 40-minute seminar, which will be followed by a discussion time. The topics for the scenarios will cover many of the commonly occurring disorders of vision, ranging from ocular conditions such as corneal dystrophies, glaucoma and refractive error to higher visual processing conditions such as dyslexia and may include rarer clinical conditions or visual or optical problems in the environment. Even though each group will be working in detail on one scenario, they will be learning about the other scenarios from the presentations given at the end of the semester.

**Assessment:** A 40-minute scenario-based group seminar presentation during the semester (30%); a 3-hour written examination in the examination period (70%).

**Prescribed texts:** Comprehensive reading material in the form of reference lists and reference material will be provided.

### 655-328 Visual Neuroscience

**Note:** Students may only gain credit for one of 655-328 or 655-028 (prior to 2006).

**Credit points:** 12.5

**Coordinator:** A/Prof T Vidyasagar

**Prerequisites:** Optometry 655-221 and 655-222.

**Contact:** 24 lectures (two 1-hour lectures per week) plus six 3-hour practicals/tutorials (*Semester 1*).

**Description:** This subject aims to provide students with a very sound neuro-anatomical and neurophysiological knowledge base which will help them understand the structure-function relationships underlying sensory information processing with particular emphasis on the visual system.

The series of lectures begins with a brief revision of the molecular and cellular mechanisms that allow signal transmission among neurones and then leads the student to an understanding of the neural mechanisms that underlie integrative processes of the brain ("systems neuroscience"), with particular reference to the visual system. The student will gain a detailed understanding of how visual information is first coded by anatomically distinct types of cells that carry functionally different types of information from the retina, and how later at further stages of the visual pathways, a meaningful integration of

these inputs is enabled. The lectures will include a detailed account of the functional architecture of the visual cortex and neural mechanisms of visual attention, as well as an account of how our sense of balance and visual functions are related. The natural and abnormal development of the retino-striate pathways together with neural plasticity, both at molecular and systems levels, will also be covered in detail. The lectures will also show examples of how discoveries of basic neural mechanisms help in understanding of symptoms in neurological diseases and of some unusual perceptual phenomena. The subject should also prepare the student to engage in future developments of neuroscience in a laboratory or industry setting.

**Assessment:** Ongoing assessment of practical work during the semester (10%); two 30-minute written examinations held during semester (10%); a 3-hour written examination in the examination period (80%).

**Prescribed texts:** E R Kandel, J H Schwartz, T M Jessell, *Principles of Neural Science*, 3rd edn, Appleton and Lange, 1991 (or later edition).

### 655-341 Ocular Histopathology

**Credit points:** 12.5

**Coordinator:** Dr A Gentle

**Prerequisites:** 655-201; Pathology 531-202 or 531-201.

**Contact:** 25 one-hour lectures and 21 hours of practical and tutorial classes (*Semester 1*).

**Description:** This subject will require the student to apply knowledge gained in 531-201/531-202 Principles of Pathology and 655-201 Anatomy and Histology of the Eye to understanding the changes which occur in the ocular tissues during eye disease. Upon completion of this subject students should understand the general principles of inflammation and wound healing as applied to ocular tissues. In addition, students will understand the process of tissue damage secondary to traumatic or infectious insult, along with the different aspects of the immune response. Students should be able to identify and interpret the light and electron microscopic changes that occur within ocular tissues during different disease processes. Specific topics to be covered will include ocular disease processes associated with cell injury and cell death, the immune response and allergy, development and ageing, the nervous system, surgical and non-surgical trauma, neoplasia, glaucoma, and the circulatory, haemopoietic and endocrine systems. Throughout the subject an emphasis will also be placed on the student developing a good understanding of the pathogenesis of ocular diseases.

**Assessment:** A 35-minute slide examination based on practical work held during the semester (20%); a 2-hour written examination in the examination period (80%). Hurdle requirement: students must submit a satisfactorily completed computer-aided learning worksheet following each practical class.

**Recommended texts:** M Yanoff and B S Fine, *Ocular Pathology*, 5th edn, Mosby-Wolfe, 2003.

### 655-351 Ophthalmic Lenses and Dispensing

**Note:** Students may only gain credit for one of 655-351 or 655-359 (prior to 2007).

**Credit points:** 12.5

**Coordinator:** Dr M Pianta

**Prerequisites:** One of 655-101, 655-102 or 655-202 and one of 655-210 or 655-311.

**Contact:** 24 lectures (two per week), 24 hours of practical classes and 12 hours of tutorial/computer-aided learning (CAL) (*Semester 2*).

**Description:** On completion of this subject, students should be familiar with the properties of ophthalmic optical materials and the indications for their use. Understand the optics of ophthalmic lenses and be able to calculate the performance characteristics of ophthalmic lenses and optical devices. Students will be able to dispense prescriptions and check dispensed visual aids to Australian standards. The subject will cover the properties of ophthalmic materials; the optics and design of bifocal and multifocal lenses relating to dispensed spectacle corrections; magnification effects, eikonic corrections and low vision aids; absorptive lenses; safety lenses; ophthalmic dispensing techniques; frame design, materials and adjustments; and dispensing tolerances, prescription verification and vertometry. The practical classes will introduce students to the processes of ophthalmic dispensing. Computer-aided learning will include a series of assignments that must be completed and submitted during the semester.

**Assessment:** Computer-aided learning (CAL) and written assignments totalling 1000 words due throughout the semester (20%); a 100-minute practical examination in ophthalmic lenses and dispensing in the examination period (20%); a 2-hour written examination in the examination period (60%). Satisfactory completion of all three assessment components is necessary to pass the subject.

**Prescribed texts:** M Jalie, *Ophthalmic Lenses and Dispensing*, Butterworths, 2003 (or later edition). An additional reference list will be provided.

### 655-359 Ophthalmic Lenses and Optical Dispensing

**Note:** This subject is only available to students who previously attempted the subject in 2006.

**Credit points:** 12.5

**Coordinator:** Dr M Pianta

**Prerequisites:** One of Optometry 655-210 or 655-219 or 655-311.

**Contact:** 36 lectures (three per week), 24 hours of practical classes and 12 hours of tutorial/computer-aided learning (CAL) (*Semester 2*).

**Description:** This subject will apply the optics knowledge and skills obtained in the prerequisite subjects to the design, prescription and dispensing of ophthalmic lenses. On completion of this subject, students will have a detailed understanding of the optics of ophthalmic lenses. In addition, students will be familiar with the properties of ophthalmic optical materials and the indications for their use. Students will have the skills to dispense prescriptions and check dispensed visual aids for compliance with the Australian standards. The subject will cover the properties of ophthalmic materials; the optics and design of bifocal and multifocal lenses; anisometropia, magnification effects, eikonic corrections and low vision aids; absorptive lenses; safety lenses; ophthalmic dispensing techniques; frame design, materials and adjustments; and dispensing tolerances, prescription verification and vertometry. The practical classes will introduce students to the processes of ophthalmic dispensing. Computer-aided learning will include a series of assignments that must be completed and submitted during the semester.

**Assessment:** Computer-aided learning (CAL) and written assignments totalling 1000 words due during the semester (15%); a 100-minute practical examination in the examination period (15%); a 3-hour written examination in the examination period (70%). Satisfactory completion of all three assessment components is necessary to pass the subject.

**Prescribed texts:** M Jalie, *Ophthalmic Lenses and Dispensing*, Butterworths, 2003 (or later edition).

### 600-312 Research Project B

See full subject details on page 1.

### Available to BOptom students only

### 655-032 Foundations of Ocular Function & Disease

**Note:** This subject is only available to BOptom students.

**Credit points:** 25

**Coordinator:** Dr A Gentle

**Prerequisites:** Approval from the Head of Department.

**Contact:** This subject will be completed by guided learning and up to 12 hours of tutorial sessions (*Semester 2*).

**Description:** The purpose of this subject is to guide candidates in reinforcing and further developing their knowledge of the biomedical and psychophysical sciences, specifically in the context of normal ocular function, and the diagnosis and clinical management of abnormalities and disorders of the eye. The subject content will include:

- anatomy and embryology with an emphasis on clinically important structures, especially the blood supply to the brain, the cranial nerves relevant to ophthalmic practice, and embryology relevant to common congenital conditions;
- genetics of eye disease;
- biochemistry and metabolism: review of the key biochemical pathways; changes to ocular tissues in disease, metabolic demands of the retina, glucose and oxygen deprivation;
- general principles of pathology and immunology and their specific manifestations within the eye. Review of the general principles of pharmacology and microbiology and their specific application in the eye; and
- basic psychophysical techniques as applied to understanding of the light sense, colour vision, form sense (spatial/temporal resolution) and the perception of depth.

**Assessment:** Two 2000-word assignments due during semester (20% each); a 3-hour written examination in the examination period (60%).

**Prescribed texts:** Students will be provided with a comprehensive study guide, which will provide basic information and direct students to specific texts for detailed study.

### 655-311 Optical Design and Ophthalmic Metrology

**Note:** This subject is only available to BOptom students repeating the subject from 2005 or 2006.

**Credit points:** 12.5

**Coordinator:** Dr A Anderson

**Prerequisites:** 655-101, 655-102 or 655-202 Optical Systems.

**Contact:** 36 lectures (three per week) and 24 hours of practical work including assignments on optical design. There will also be assignments on ophthalmic lens calculations to complete during the semester (*Semester 2*).

**Description:** The purpose of this subject is to provide an understanding of the principles and techniques of optical design including an understanding of the control and optimisation of aberrations. It is an introduction to ophthalmic lenses and spectacle lens design. The topics covered include aberration theory, optical design and control of aberrations including the design of ophthalmic lenses, advanced photometry and radiometry, and optics of commonly used ophthalmic instruments. Practical classes will include computer-aided tutorials on both optical design and lens calculations.

**Assessment:** Ongoing assessment of practical work and assignments due during the semester (20%); a 3-hour written examination in the examination period (80%). Satisfactory completion of both written and practical work is necessary to pass the subject.

**Prescribed texts:** G Smith and D A Atchison, *The Eye and Visual Optical Instruments*, Cambridge University Press, 1997. • M Jalie, *The Principles of Ophthalmic Lenses*, 4th edn, Assoc Brit Disp Opticians, 1984 (or later edition). • D B Henson, *Optometric Instrumentation*, 2nd edn, Butterworths, 1996 (or later edition). An additional reference list will be provided.

### 655-330 Functional Disorders of Vision

**Note:** This subject is only available to BOptom students.

**Special requirements:** Students should have an approved direct ophthalmoscope and retinoscope, gonioscopy, binocular indirect ophthalmoscope, two fundus lenses epilation forceps, two white coats, pre-focused pen torch or transilluminator, inter-pupillary rule, a set of optical screwdrivers, cover paddle, phoria card and a set of four flippers. Students are strongly advised to purchase their own equipment which they will continue to use in 4<sup>th</sup>-5<sup>th</sup> year and after graduation. However, those students who do not have their own equipment will be able to borrow equipment for classes. Students are required to conform to prescribed dress and conduct requirements when assigned to all clinical duties with patients.

**Credit points:** 25

**Coordinator:** Prof N A McBrien

**Prerequisites:** Successful completion of all 200-level subjects.

**Contact:** 72 lectures (three per week), 144 hours of practical work (six hours per week through the year) which includes rostered clinical practice in the last eight weeks of Semester 2 (*Year long*).

**Description:** This subject gives a detailed account of the nature, origins, course, treatment and prognosis of the congenital and developmental disorders of vision and provides training in the optometric procedures for the examination of the eyes and for the treatment of visual disorders. On completion of the subject students will be able to investigate patients' visual problems, make a diagnosis and plan an appropriate course of management. Topics include refractive anomalies of the eye including explanations of the origin and development of refractive errors and methods of refraction; anomalies of accommodation including presbyopia; the anomalies of ocular motility and binocular vision including their clinical assessment and treatment; disorders of the light sense; and strategies of problem solving, history taking and case assessment. There is a series of lectures on the scientific method in clinical sciences and on disorders of higher visual function. A series of lectures on clinical assessment of colour vision disorders is given in Semester 2. Practical sessions introduce students to the methods of determination of refraction, assessment and treatment of disorders of ocular motility and binocular coordination, and the detection of ocular disease. Students are required to complete weekly assignments to develop their clinical skills. In the latter part of the semester 2, students undertake clinical practice and the examination of patients in a clinical setting.

**Assessment:** A 3-hour written examination in the first semester examination period (40%); a 3-hour written examination in the second semester examination period (40%); clinical practice assignments during second semester (20%). Satisfactory completion of the clinical practice assessment is necessary to pass the subject.

**Hurdle Requirement:** a 1-hour practical examination in clinical methods is held at the end of the first semester, which must be passed in order to proceed with clinical practice in the second semester.

**Prescribed texts:** A G Bennett and R B Rabbetts, *Clinical Visual Optics*, 3rd edn, Butterworths, 1998. • M Scheiman and B Wick, *Clinical Management of Binocular Vision*, Philadelphia Lippincott, 1994. • K Zadnik, *The Ocular Examination, Measurements and Findings*, W B Saunders, 1997.

### 655-332 Functional Disorders of Vision II

**Note:** This subject is only available to BOptom students.

**Special requirements:** Students should have an approved direct ophthalmoscope and retinoscope, gonioscopy, binocular indirect ophthalmoscope, two fundus lenses epilation forceps, two white coats, pre-focused pen torch or transilluminator, inter-pupillary rule, a set of optical screwdrivers, cover pad-

dle, phoria card and a set of four flippers. Students are strongly advised to purchase their own equipment which they will continue to use in 4<sup>th</sup>-5<sup>th</sup> year and after graduation. However, those students who do not have their own equipment will be able to borrow equipment for classes. Students are required to conform to prescribed dress and conduct requirements when assigned to all clinical duties with patients.

**Credit points:** 12.5

**Coordinator:** Prof N McBrien

**Prerequisites:** Approval from the Head of Department.

**Contact:** 36 lectures (three per week) and 72 hours of practical work (six hours per week) which includes rostered clinical practice in the last eight weeks of semester (*Semester 2*).

**Description:** This subject gives a detailed account of the nature, origins, course, treatment and prognosis of the congenital and developmental disorders of vision and provides training in the optometric procedures for the examination of the eyes and for the treatment of visual disorders. On completion of the subject students will be able to investigate patients' visual problems, make a diagnosis and plan an appropriate course of management. Topics include refractive anomalies of the eye including explanations of the origin and development of refractive errors and methods of refraction; the clinical assessment of accommodation including presbyopia; the clinical assessment and treatment of ocular motility and binocular vision; disorders of the light sense; and strategies of problem solving, history taking and case assessment. Practical sessions introduce students to the methods of determination of refraction, assessment and treatment of disorders of ocular motility and binocular coordination, and the detection of ocular disease. Students are required to complete weekly assignments to develop their clinical skills. In the latter part of Semester 2, students undertake clinical practice and the examination of patients in the clinic.

**Assessment:** Reports on clinical methods assignments and two patient assessments during the semester (15%); a 3-hour written examination in the examination period (85%). Satisfactory completion of the practical and written examination components and the clinical practice is necessary to pass the subject.

**Prescribed texts:** A G Bennett and R B Rabbetts, *Clinical Visual Optics*, 3rd edn, Butterworths, 1998. • M Scheiman and B Wick, *Clinical Management of Binocular Vision*, Philadelphia Lippincott, 1994. • K Zadnik, *The Ocular Examination, Measurements and Findings*, W B Saunders, 1997.

### 655-422 Occupational Optometry, Visual Standards

**Note:** This subject is only available to BOptom students.

**Credit points:** 12.5

**Coordinator:** Dr A Anderson

**Prerequisites:** Optometry 655-441, 655-451 and 655-461.

**Corequisites:** Optometry 655-430, 655-442 and 655-462.

**Contact:** 24 lectures (two per week), 12 1-hour tutorials and 12 hours of laboratory work (*Semester 2*).

**Description:** The aim of this subject is to detail the visual problems that can be encountered in the workplace. Topics to be covered are lighting and its effect on visual tasks, visual standards for various tasks, eye injuries in the workplace, the role of eye protectors in reducing eye injuries, the visual ergonomics of a variety of visually demanding tasks such as sustained computer screen reading or microscopy. The role of national and international standards in providing guidance for safe practice will be stressed and particular attention will be given to relevant Australian standards.

**Assessment:** Six written practical-based assignments of up to 500 words each due during the semester (20%); a 2-hour written examination in the examination period (80%).

**Prescribed texts:** D G Pitts and R N Kleinstein, *Environmental Vision*, Butterworth-Heinemann, 1993 (or later edition).

### 655-430 Clinical Optometry Practice

**Note:** This subject is only available to BOptom students.

**Credit points:** 25

**Coordinator:** Prof N McBrien

**Prerequisites:** Optometry 655-321; 655-341; 655-028 or 655-328; 655-330 or 655-332; 655-351 or 655-359; and microbiology 526-306.

**Corequisites:** Optometry 655-441, 655-451 and 655-461.

**Contact:** 24 hours of lectures, 24 hours of clinical tutorials and 96 hours of clinical practice and demonstrations. Students are rostered to attend the clinics at the Victorian College of Optometry (*Year long*).

**Description:** In this subject students will develop their clinical skills with direct patient consultations and management. Students will utilise the optometric techniques learned in 655-330 and refine and improve their patient management skills. Under supervision, students will learn appropriate assessment of patient history and symptoms, and patient communication skills. Application of standard optometric techniques will be undertaken in direct

patient management and students will develop their clinical routine. Students will in addition see contact lens patients and observe low vision and paediatric consultations.

**Assessment:** Ongoing assessment of clinical work throughout the semester (45%); a 2-hour practical and oral examination in the first semester examination period (20%); a 2-hour written examination in the second semester examination period (35%). Satisfactory completion of all three components of assessment is necessary to pass the subject.

**Recommended texts:** K Zadnik, *The Ocular Examination, Measurements and Findings*, WB Saunders, 1997 (or later edition). • D B Elliott, *Clinical Procedures in Primary Care*, 2nd Edn. Butterworth Heinemann (or later edition).

### 655-441 Diagnosis of Ocular Disease I

**Note:** This subject is only available to BOptom students.

**Credit points:** 12.5

**Coordinator:** A/Prof A Vingrys

**Prerequisites:** Optometry 655-321; 655-341; 655-028 or 655-328; 655-330 or 655-332; 655-351 or 655-359; and Microbiology 526-306.

**Corequisites:** Optometry 655-430, 655-451 and 655-461.

**Contact:** 24 1-hour lectures (two per week) and 2 1-hour tutorials (*Semester 1*).

**Description:** Since optometry is a first point of entry into the Australian health care system, optometrists have an obligation to correctly diagnose ocular disease and systemic disease having ocular manifestations. The objectives of 655-441 and its companion subject 655-442 are to develop understanding in these conditions and to lay the basis for clinical decision-making and problem solving as required in the complete optometric examination and subsequent management of patients. On completion of 655-441, students will be thoroughly familiar with the nature, course and prognosis of anterior eye disease and glaucoma, and appreciate the various differential diagnoses. The subject builds on past learning by covering the pathology, cause, course, differential diagnoses and management of ocular diseases and of systemic diseases having ocular manifestations.

**Assessment:** A 30-minute written examination held mid-semester (10%); a 2-hour written examination in the examination period (75%); a slide test on eye disease recognition held in the examination period (15%).

**Prescribed texts:** C J Rapuano & W-J Heng, *Cornea: colour atlas and synopsis of clinical ophthalmology*, New York, McGraw-Hill, Medical Publishing Division, 2003 (or later edition). • D J Rhee, *Glaucoma: colour atlas and synopsis of clinical ophthalmology*, New York, McGraw-Hill, Medical Publishing Division, 2003 (or later edition).

**Recommended texts:** N.B. The *Colour Atlas and Synopsis of Clinical Ophthalmology Series* is also available as a five-volume set.

J J Kanski, *Clinical Ophthalmology*, 5th edn, Oxford Butterworth-Heinemann, 2003 (or later edition). • R Penne, *Oculoplastics: colour atlas and synopsis of clinical ophthalmology*, New York, McGraw-Hill, Medical Publishing Division, 2003 (or later edition).

### 655-442 Diagnosis of Ocular Disease II

**Note:** This subject is only available to BOptom students.

**Credit points:** 12.5

**Coordinator:** A/Prof A Vingrys

**Prerequisites:** Optometry 655-441, 655-451 and 655-461.

**Corequisites:** Optometry 655-422, 655-430 and 655-462.

**Contact:** 24 1-hour lectures (two per week) and 2 1-hour tutorials (*Semester 2*).

**Description:** Since optometry is a first point of entry into the Australian health care system, optometrists have an obligation to correctly diagnose ocular disease and systemic disease having ocular manifestations. The objectives of 655-442 and its companion subject 655-441 are to develop understanding in these conditions and to lay the basis for clinical decision-making and problem solving as required in the complete optometric examination and subsequent management of patients. On completion of 655-442, students will be thoroughly familiar with the nature, course and prognosis of posterior eye disease and neurological disorders, and appreciate the various differential diagnoses. The subject builds on past learning by covering the pathology, cause, course, differential diagnoses and management of ocular diseases and of systemic diseases having ocular manifestations.

**Assessment:** A 30-minute written examination held mid-semester (10%); a 2-hour written examination in the examination period (75%); a slide test on eye disease recognition held in the examination period (15%).

**Prescribed texts:** A C Ho et al (eds), *Retina: colour atlas and synopsis of clinical ophthalmology*, New York, McGraw-Hill, Medical Publishing Division, 2003 (or later edition).

**Recommended texts:** N.B. The *Colour Atlas and Synopsis of Clinical Ophthalmology Series* is also available as a five-volume set.

J J Kanski, *Clinical Ophthalmology*, 5th edn, Oxford Butterworth-Heinemann, 2003 (or later edition). • P J Sorvino & H V Danesh-Meyer, *Neuro-ophthalmology: colour atlas and synopsis of clinical ophthalmology*, New York, McGraw-Hill, Medical Publishing Division, 2003 (or later edition).

### 655-451 Contact Lenses

**Credit points:** 12.5

**Coordinator:** Dr A McKendrick

**Prerequisites:** 655-330, 655-341, 655-028, 655-321, 655-351 and Microbiology 526-306.

Optometry 655-321; 655-341; 655-028 or 655-328; 655-330 or 655-332; 655-351 or 655-359; and Microbiology 526-306.

**Corequisites:** Optometry 655-430, 655-441 and 655-461.

**Contact:** 36 1-hour lectures/tutorials (three per week) and 12 2-hour practical classes (*Semester 1*).

**Description:** On completion of this subject, students should have a broad understanding of contact lens practice. The subject covers the underlying physiological and optical principles of contact lenses, the measurement of contact lens specifications using relevant instrumentation, the handling of contact lenses and routine procedures for cleaning and disinfecting hard and soft contact lenses, the insertion and removal of hard and soft contact lenses; the conduct of a preliminary examination for contact lenses, techniques for assessment of the physical fit of contact lenses on the eye, the rationales behind current methods of fitting the various types of contact lenses including the high Dk soft extended wear lenses and the recognition, interpretation and management of signs and symptoms and abnormal conditions which may be induced by contact lens wear.

**Assessment:** Ongoing assessment of practical work during the semester (10%); a 2000 word written assignment due during the semester (10%); a 30-minute written examination held mid-semester (10%); a 2-hour written examination in the examination period (70%). Satisfactory completion of all components of assessment is necessary to pass the subject.

**Prescribed texts:** N Efron (ed), *Contact Lens Practice*, Butterworth-Heinemann, 2003 (or later edition).

### 655-461 Assessment of Ocular Disease

**Note:** This subject is only available to BOptom students.

**Credit points:** 12.5

**Coordinator:** Dr M Pianta; Dr A McKendrick

**Prerequisites:** Optometry 655-321; 655-341; 655-028 or 655-328; 655-330 or 655-332; 655-351 or 655-359; and Microbiology 526-306.

**Corequisites:** Optometry 655-430, 655-441 and 655-451.

**Contact:** 13 one-hour lectures, 11 one-hour tutorials and 12 two-hour practicals (*Semester 1*).

**Description:** The purpose of this subject is to provide candidates with the theory and practical knowledge of the methods and techniques used in the assessment of eye diseases. There are two major objectives for this subject. Learning the use, administration and interpretation of biological tests or laboratory assays as they pertain to the eye and learning the methods for direct evaluation of ocular tissues and structures. The subject will detail five areas of assessment: ocular, functional, systemic, structural and neurological. Ocular assessment will consider binocular indirect methods, fundus lenses, gonioscopy and scleral indentation. Functional assessment will address visual field testing, electrodiagnostic methods and lacrimal system procedures. Systemic assessment will consider issues relevant to the eye and eye disorders such as, investigation of blood constituents (eg. glucose, FBC, ESR etc.) and blood flow assessment (blood pressure and flow patency). Structural assessment will examine medical imaging technologies (X-ray, CT-scan, MRI) especially as they relate to the eye and visual pathways. In addition, advanced methods for ocular evaluation such as scanning laser ophthalmoscopy, ocular coherence tomography and ultrasound will be described. The blood-retina barrier and methods for its evaluation will also be detailed and discussed. Neurological assessment will discuss pupil and cranial nerve investigation. It is expected that candidates become proficient in these techniques

**Assessment:** Ongoing skills assessment throughout the semester (20%); a portfolio consisting of two pieces of written group work (1750 words each), one piece of individual written work (1750 words) and an individual written reflection on how learning in this subject will impact on clinical practice (500 words) due throughout the semester (30%); a 2-hour written examination in the examination period (50%). Satisfactory completion of all assessment components is necessary to pass the subject.

**Recommended texts:** Casser et al, *Atlas of Primary Eyecare Procedures*, 2nd Edition, 1997 (or later edition).

### 655-462 Therapeutic Management of Ocular Disease

**Note:** This subject is only available to BOptom students.

**Credit points:** 12.5

**Coordinator:** A/Prof A Vingrys; Dr A Gentle

**Prerequisites:** Optometry 655-441 and 655-461.

**Corequisites:** Optometry 655-430 and 655-442.

**Contact:** 12 one-hour lectures, 6 two-hour Computer Aided Learning practicals, and 12 two-hour seminars (*Semester 2*).

**Description:** The purpose of this subject is to provide students with a sound knowledge of the range of prescription drugs used in the management of eye disease, along with the appropriate protocols and precautions necessary for their safe and effective clinical use. The subject will consist of three components: Firstly, a lecture series to guide the student on the formulations available, the indications and contra-indications for their use and the current clinical protocols employed in the use of these formulations. Lecture topics covered will include anti-microbial, anti-viral, anti-inflammatory and anti-glaucoma medications; Secondly, a series of CAL practical sessions in which the student will be encouraged to apply knowledge gained in the lectures to a theoretical series of clinical situations; Thirdly, a series of seminars on the therapeutic management of ocular disease in which the students will prepare and present their management strategies in response to a variety of case histories and the supervising clinician will discuss current best-practice management associated with these cases and highlight issues associated with incorrect diagnosis. By the end of this subject the student will be required to have demonstrated a sound theoretical knowledge of the range and application of specific groups of therapeutic drugs in the management of eye disease.

**Assessment:** A 10-minute oral presentation on a case report during the semester (20%); computer-aided learning assignments due during the semester (20%); a 2-hour written examination in the examination period (60%).

**Prescribed texts:** A S Bruce and M S Loughnan, *Anterior Eye Disease and Therapeutics A-Z*, Butterworth-Heinemann, 2002 (or later edition). • D Y Kunimoto et al, *The Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease*, 4th edn, Lippincott, Williams and Wilkins, 2004 (or later edition).

### 655-510 General Optometry Practice

**Note:** This subject is only available to BOptom students.

**Credit points:** 25

**Coordinator:** Prof N McBrien; Ms A Cochrane

**Prerequisites:** Optometry 655-422, 655-430, 655-442 and 655-462.

**Contact:** 24 hours of lectures and no less than 200 hours of clinical work and clinical demonstrations. Students are rostered to attend the clinics of the Victorian College of Optometry including clinics based in Community Health centres at Broadmeadows, Darebin and Sunshine throughout the prescribed clinical year (*Year long*).

**Description:** On completion of this subject, students will have a broad and strong command of their knowledge of the disorders of vision and their management; have developed a very high level of skill with optometric procedures and will be competent in the identification, diagnosis and resolution of patient visual problems. They will also be skilled in patient communication. The core of the subject is the examination and treatment of patients in the general clinics of the Victorian College of Optometry, including clinics based in Community Health centres at Broadmeadows, Darebin and Sunshine throughout the prescribed clinical year. In addition, lectures and tutorials will provide detailed information on professional ethics and practice management and general medicine with emphasis on those systemic diseases with ocular manifestations and the diagnosis and management of abnormal colour vision. Students are also required to dispense a proportion of the spectacle prescriptions they write during their attendance at clinics and complete other dispensing assignments.

**Assessment:** Progressive assessment of clinical work throughout the year (40%); practical skills tests, written clinical reports (5 reports of 2000 words each) and oral examinations throughout the year (25%); a 3-hour written examination in the second semester examination period (35%). Satisfactory completion of all three components of assessment is necessary to pass the subject.

**Prescribed texts:** A reading list will be provided.

### 655-520 Specialist Optometry Practice

**Note:** This subject is only available to BOptom students.

**Credit points:** 25

**Coordinator:** Prof N McBrien; Ms A Cochrane

**Prerequisites:** Optometry 655-422, 655-430, 655-442 and 655-462.

**Corequisites:** Optometry 655-510 and 655-540.

**Contact:** 24 hours of lectures, 24 hours of tutorials and no less than 200 hours of clinical work and clinical demonstrations. Students are rostered to attend the specialty clinics of the Victorian College of Optometry including the Kooyong Low Vision Clinic, throughout the prescribed clinical year (*Year long*).

**Description:** This subject provides a detailed account of three aspects of specialty optometric practice: contact lenses, pediatrics and low vision. This subject is aimed at providing students with a thorough background in the clinical aspects of contact lens practice. Students will gain experience in all aspects of contact lens practice including: fitting of soft and hard lenses, care of contact lenses, and complications associated with contact lens wear. Students will also gain experience in the more advanced aspects of contact lens fitting and care including fitting of lenses for specific eye conditions such as keratoconus, presbyopia and following corneal surgery. Students will gain a detailed understanding of the theory of binocular vision and its clinical assessment. The principal theories of childhood development and visual information processing will be covered and how to tailor a consultation to the optometric evaluation of children. Models of the accommodation-convergence system and associated disorders and the clinical management of sensory and motor aspects of strabismus. The third component (low vision), will provide a detailed account of the causes of visual loss within developed and underdeveloped countries; management of the low vision patient with respect to psychological considerations, optical and non-optical visual aids; multi-disciplinary approach to the rehabilitation of the low vision patient. The clinical component will encompass both demonstrations of the different techniques available for the management of the contact lens, pediatric or low vision patient with direct patient contact within a clinical environment. The emphasis is placed on students' ability to build a rapport with their patient, practice technical skills, relating clinical findings with symptoms and consideration of management options.

**Assessment:** Progressive assessment of clinical work throughout the year (30%); practical skills tests, written clinical reports (6 reports of 2000 words each) and oral examinations throughout the year (20%); a 3-hour written examination in the second semester examination period (50%). Satisfactory completion of all assessment components is necessary to pass the subject.

**Prescribed texts:** AA Rosenbloom & MW Morgan, *Principles and Practice of Pediatric Optometry*, JB Lippincott Co, Philadelphia, 1990 (or later edition). • PB Freeman & RT Jose, *The Art and Practice of Low Vision*, Butterworth-Heinemann, Boston, 1997 (or later edition). • N Efron (ed), *Contact Lens Practice*, Butterworth-Heinemann, 2002 (or later edition).

### 655-530 Project Studies in Vision Sciences

**Note:** This subject is only available to BOptom students.

Students cannot be credited with both this subject and 655-535 Advanced Project in Vision Science.

**Credit points:** 25

**Coordinator:** Prof N McBrien; Dr M Pianta

**Prerequisites:** Completion of at least 375 points of the BOptom degree (including credit or equivalent).

**Contact:** 12 hours of seminars; guided study and research equivalent to no less than 144 hours (approx 4 hours/week) (*Year long*).

**Description:** This subject involves an original investigation in vision science carried out under the supervision of a member of the academic staff. It will include prescribed reading and introductory seminars on a broad range of topics in the vision sciences related to the physiological and biochemical mechanisms that control the growth of the eye and maintain its integrity throughout life in both health and disease including clinical management. The project, unless otherwise approved, will involve an investigation using biochemical, molecular biological, pharmacological or advanced clinical techniques. The investigation will usually involve an in depth appraisal of the scientific literature in an area of optometric vision sciences but may also involve practical work. The purpose of the subject is to give students an appreciation of the nature and requirements of research in the clinical or basic vision sciences and to introduce them to advanced techniques of investigation while gaining an in-depth understanding of a specific area in the vision sciences which will benefit their understanding of the eye and visual system and their clinical management of ocular disorders.

**Assessment:** A 1000 word written project proposal submitted mid-clinical semester 1 (10%); an 8000-10,000 word minor thesis submitted at the end of the year (90%). Successful completion of the proposal is a hurdle requirement.

**Prescribed texts:** A reading list and materials will be provided.

### 655-535 Advanced Project in Vision Science

**Note:** This subject is only available to BOptom students.

Students cannot be credited with both this subject and 655-530 Project Studies in Vision Science.

**Credit points:** 25

**Coordinator:** Prof N McBrien; Dr M Pianta

**Prerequisites:** Completion of at least 375 points of the BOptom degree (including credit or equivalent).

**Contact:** 24 hours of seminars; guided study and research equivalent to no less than 160 hours (approx 5 hours/week) (*Year long*).

**Description:** This subject involves an original investigation in vision science carried out under the supervision of a member of the academic staff. It will include prescribed reading and introductory seminars on a broad range of topics in the vision sciences related to the physiological and biochemical mechanisms that control the growth of the eye and maintain its integrity throughout life in both health and disease including clinical management of ocular disorders. The investigation will involve practical work combined with critical appraisal of the literature in an area of optometric vision sciences. Students will also attend selected sessions of the Department's Journal Club and Vision Science Seminar Series. The purpose of the subject is to give students an appreciation of the nature and requirements of research in the clinical or basic vision sciences and to introduce them to advanced techniques of investigation and scientific writing, with an aim to providing them with a foundation for undertaking more advanced research, such as in a research higher degree. Students will gain a thorough understanding of a specific area in the vision sciences, which will benefit their understanding of the eye and visual system and the clinical management of ocular disorders.

**Assessment:** A 1000 word written project proposal submitted mid-clinical semester 1 (10%); an 8000-10,000 word minor thesis submitted mid-clinical semester 2 (60%); and a 2000-3000 word scientific paper (based on the thesis) submitted at the end of clinical semester 2 (30%). Successful completion of the proposal is a hurdle requirement.

**Prescribed texts:** A reading list and materials will be provided.

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### 655-540 Ocular Disease Management

**Note:** This subject is only available to BOptom students.

**Credit points:** 25

**Coordinator:** Prof N McBrien; A/Prof A Vingrys

**Prerequisites:** Optometry 655-422, 655-430, 655-442 and 655-462.

**Corequisites:** Optometry 655-510 and 655-520.

**Contact:** 24 hours of lectures and tutorials and no less than 144 hours of clinical work and clinical demonstrations related to ocular disease management. Students are rostered to attend the speciality clinics of the Victorian College of Optometry, the sub-speciality clinics in a tertiary eye care facility such as the of the Royal Victorian Eye and Ear Hospital, private optometric and ophthalmological practices throughout the clinical year (*Year long*).

**Description:** This subject provides a detailed approach to the clinical management of ocular disease and builds upon the previous didactic studies on ocular disease and pathology. Students will gain a detailed knowledge of the practical management of patients with a wide range of ocular conditions. Students will observe and manage patients under supervision in the disease clinics of the Victorian College of Optometry. They will attend clinics of the Royal Victorian Eye and Ear Hospital to gain exposure to a wide range of acute and chronic presentations of ocular disease. Training will incorporate the therapeutic management of ocular disease and the develop skills in the shared care co-management of patients with ophthalmology.

**Assessment:** Progressive assessment of clinical work throughout the year (30%); practical skills tests, written clinical reports (4 reports of 2000 words each) and oral examinations throughout the year (20%); a 3-hour written examination in the second semester examination period (50%). Satisfactory completion of all components of assessment is necessary to pass the subject.

**Prescribed texts:** A reading list will be provided.

