### VIS SCI 24 Freshman Seminars 1 Unit

**Terms offered:** Spring 2020, Spring 2019, Fall 2018  

The Freshman Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Freshman seminars are offered in all campus departments, and topics vary from department to department and semester to semester. Enrollment limited to 15 freshmen.

**Rules & Requirements**

**Repeat rules:** Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1 hour of seminar per week

**Additional Details**

**Subject/Course Level:** Vision Science/Undergraduate  

**Grading/Final exam status:** The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminars: Read More [+]

Freshman Seminars: Read Less [-]

### VIS SCI 39 Freshman and Sophomore Seminar 1.5 - 3 Units

**Terms offered:** Spring 2020, Fall 2019, Fall 2018  

Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty but the suggested limit is 25.

**Rules & Requirements**

**Repeat rules:** Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 1.5-3 hours of seminar per week

**Summer:**  

**6 weeks:** 2.5-5 hours of seminar per week  

**8 weeks:** 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Vision Science/Undergraduate  

**Grading/Final exam status:** The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman and Sophomore Seminar: Read More [+]

Freshman and Sophomore Seminar: Read Less [-]

### VIS SCI 84 Sophomore Seminar 1 or 2 Units

**Terms offered:** Fall 2020, Spring 2020, Fall 2019  

Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.

**Rules & Requirements**

**Prerequisites:** At discretion of instructor  

**Repeat rules:** Course may be repeated for credit when topic changes.

**Hours & Format**

**Fall and/or spring:**  

**5 weeks:** 3-6 hours of seminar per week  

**10 weeks:** 1.5-3 hours of seminar per week  

**15 weeks:** 1-2 hours of seminar per week

**Summer:**  

**6 weeks:** 2.5-5 hours of seminar per week  

**8 weeks:** 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

**Additional Details**

**Subject/Course Level:** Vision Science/Undergraduate  

**Grading/Final exam status:** The grading option will be decided by the instructor when the class is offered. Final exam required.

Sophomore Seminar: Read More [+]

Sophomore Seminar: Read Less [-]

### VIS SCI 199 Supervised Independent Study and Research 1 - 4 Units

**Terms offered:** Fall 2020, Spring 2020, Fall 2019  

Supervised independent study and research. Enrollment restrictions apply; see the Introduction to Courses and Curricula section of this catalog.

**Rules & Requirements**

**Prerequisites:** Upper division status and consent of instructor, the student’s major adviser and the departmental chair  

**Repeat rules:** Course may be repeated for credit without restriction.

**Hours & Format**

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week

**Summer:**  

**8 weeks:** 1.5-7.5 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Vision Science/Undergraduate  

**Grading/Final exam status:** Offered for pass/not pass grade only. Final exam required.

Supervised Independent Study and Research: Read More [+]

Supervised Independent Study and Research: Read Less [-]
VIS SCI 201A Seminar in Vision Science 2

Units
Terms offered: Fall 2020, Fall 2019, Fall 2015
Graduate seminar in vision science.
Seminar in Vision Science: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Offered for satisfactory/unsatisfactory grade only.
Instructor: VS faculty
Seminar in Vision Science: Read Less [-]

VIS SCI 201B Seminar in Vision Science 2

Units
Terms offered: Spring 2020, Spring 2019, Spring 2018
Graduate seminar in vision science.
Seminar in Vision Science: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Offered for satisfactory/unsatisfactory grade only.
Instructor: Gronert
Seminar in Vision Science: Read Less [-]

VIS SCI 203A Geometric Optics 4 Units

Terms offered: Fall 2016, Fall 2015, Fall 2014
Geometrical methods applied to the optics of lenses, mirrors, and prisms. Thin lens eye models, magnification, astigmatism, prism properties of lenses, thick lenses.

Geometric Optics: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 101
Geometric Optics: Read Less [-]

VIS SCI 203B Optical System and Physical Optics 4 Units

Terms offered: Spring 2016, Spring 2015, Spring 2014
Principles of optical systems, principles and clinical applications of apertures and stops, aberrations and optical instruments. Optics of the eye. Selected topics in physical optics, diffraction, interference, polarization.

Optical System and Physical Optics: Read More [+]

Rules & Requirements
Prerequisites: 203A

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 102
Optical System and Physical Optics: Read Less [-]
VIS SCI 205 Visual Perception Sensitivity 4.5 Units
Terms offered: Fall 2016, Fall 2015, Fall 2014

Visual Perception Sensitivity: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 3.5 hours of lecture and 2 hours of laboratory per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 104
Visual Perception Sensitivity: Read Less [-]

VIS SCI 206A Anatomy and Physiology of the Eye 2 Units
Terms offered: Fall 2015, Fall 2014, Fall 2013
This course focuses on the anatomy and physiology of the eyeball. Overview of the gross anatomy of the eye followed by eye-relevant cellular and molecular biology. Cellular and molecular details of structure and function of each of the various non-neural components.

Anatomy and Physiology of the Eye: Read More [+]

Hours & Format
Fall and/or spring: 7.5 weeks - 4 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructors: Gong, Fleiszig
Anatomy and Physiology of the Eye: Read Less [-]

VIS SCI 206B Anatomy and Physiology of the Eye and Visual System 3 Units
Terms offered: Spring 2020, Spring 2019, Spring 2018
Structure and function of the tissues of the eye, ocular appendages, and the central visual pathways. Basic concepts of physiological, neurological, embryological, and immunological processes as they relate to the eye and vision. Foster an appreciation of the pathophysiology of various disease processes. Convey the importance of anatomy and physiology in the medical approach to ocular disease processes.

Anatomy and Physiology of the Eye and Visual System: Read More [+]

Rules & Requirements
Prerequisites: VIS Sci 206A
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 2.5 hours of lecture and 0.5 hours of laboratory per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

VIS SCI 206C Anatomy and Physiology of the Eye and Visual System 2 Units
Terms offered: Spring 2020, Spring 2019, Spring 2018
Problem-based learning approach using clinical case examples. Continuation of 206A-206B.

Anatomy and Physiology of the Eye and Visual System: Read More [+]

Rules & Requirements
Prerequisites: 206A-206B
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 7.5 weeks - 4 hours of seminar per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 106C
Anatomy and Physiology of the Eye and Visual System: Read Less [-]
**VIS SCI 206D Neuroanatomy and Neurophysiology of the Eye and Visual System 2 Units**
Terms offered: Fall 2015, Fall 2014, Fall 2013
Structure and function of the neurosensory retina, photoreceptors, RPE including blood supply. Current concepts of etiology and management of major retinal conditions. Overview of diagnostic techniques in retinal imaging, electrophysiologic testing and new genetic approaches.
Structure and function of the early visual pathway including retinal ganglion cells, optic nerves, lateral geniculate nucleus and visual cortex. Pupillary responses. Specialization in the visual cortex.
Neuroanatomy and Neurophysiology of the Eye and Visual System: Read More [+]

**Rules & Requirements**
Prerequisites: 206A (must be taken concurrently)

**Hours & Format**
Fall and/or spring: 7.5 weeks - 4 hours of lecture per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructors: Flannery, Freeman
Formerly known as: half of 206A

**VIS SCI 215 Visual System Development 2 Units**
Terms offered: Fall 2015, Fall 2014, Fall 2013
Visual System Development: Read More [+]

**Rules & Requirements**
Prerequisites: 206B

**Hours & Format**
Fall and/or spring: 15 weeks - 2 hours of lecture per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 115

**VIS SCI 217 Oculomotor Functions and Neurology 2 Units**
Terms offered: Spring 2016, Spring 2015, Spring 2014
Neuro-anatomical pathways for the control of eye position and movement; gaze holding, image stabilization and tracking eye movement systems; oculomotor signs of disorders of the central nervous system (palsies, nystagmus, opthalmoplegia, cog-wheel pursuits, saccadic dysmetria); the near visual-motor response and the synergistic coupling of accommodation and convergence; binocular misalignment (heterophoria and fixation disparity); and presbyopia.
Oculomotor Functions and Neurology: Read More [+]

**Rules & Requirements**
Prerequisites: 203B or consent of instructor

**Hours & Format**
Fall and/or spring: 15 weeks - 1.5 hours of lecture and 10 hours of laboratory per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 117

**VIS SCI 219 Binocular Vision and Space Perception 2 Units**
Terms offered: Spring 2016, Spring 2015, Spring 2014
Perception of space, direction, and distance. Binocular retinal correspondence, horopters, differential magnification effects and anomalies of binocular vision development. Sensory vision, local stereopsis, static and dynamic stereopsis, binocular depth cues.
Binocular Vision and Space Perception: Read More [+]

**Rules & Requirements**
Prerequisites: 203A-203B

**Hours & Format**
Fall and/or spring: 15 weeks - 1.5 hours of lecture and 10 hours of laboratory per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Formerly known as: 118

Binocular Vision and Space Perception: Read Less [-]
**VIS SCI 230 Ethics in Scientific Research 2 Units**
Terms offered: Spring 2020, Spring 2018, Spring 2016
This seminar will examine a range of ethical issues that arise in the process of doing science. Beginning with the philosophical and social foundations, we will consider the pathogenesis of fraud, statistics and deception, the ethics of authorship and publication, research with human subjects, the use of animals, the definition(s) of misconduct and the difference between misconduct and questionable research practices, the relationship between industry and science, and finally, the responsibilities and obligations of the scientist in society.

Ethics in Scientific Research: Read More [+]

**Hours & Format**
Fall and/or spring: 15 weeks - 30 hours of seminar per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Ethics in Scientific Research: Read Less [-]

**VIS SCI 260A Optical and Neural Limits to Vision 3 Units**
Terms offered: Fall 2020, Fall 2019, Fall 2018
The course will provide an overview of the early stage limits to human vision, from the eye's optics to sampling and processing in the retina. Students will learn basic optical properties of the eye as well as objective and subjective techniques on how to measure limits of human vision. The class will comprise a combination of lectures and active learning by the students in the form of a project, to be presented at the end of the semester. This is one of the four courses that form the Vision Science core curriculum.

Optical and Neural Limits to Vision: Read More [+]

**Rules & Requirements**
Repeat rules: Course may be repeated for credit with instructor consent.

**Hours & Format**
Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Instructor: Austin Roorda
Optical and Neural Limits to Vision: Read Less [-]

**VIS SCI 260B Introduction to Ocular Biology 3 Units**
Terms offered: Fall 2020, Fall 2019, Fall 2018
The course will provide an overview of eye development, anterior eye ocular anatomy and physiology and ocular disease. The course will be a combination of didactic lectures and problem-based learning. This is one of the four courses that form the Vision Science core curriculum.

Introduction to Ocular Biology: Read More [+]

**Rules & Requirements**
Repeat rules: Course may be repeated for credit with instructor consent.

**Hours & Format**
Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Instructor: Suzanne Fleiszig
Introduction to Ocular Biology: Read Less [-]

**VIS SCI 260C Introduction to Visual Neuroscience 3 Units**
Terms offered: Spring 2020, Spring 2019, Spring 2018
The course will provide an overview of the neuroscience of vision, spanning the entire neural pathway from retinal neurobiology to cortical processing of visual signals. The class will comprise a combination of lectures and active learning by the students in the form of a project, to be presented at the end of the semester. This is one of the four courses that form the Vision Science core curriculum.

Introduction to Visual Neuroscience: Read More [+]

**Rules & Requirements**
Repeat rules: Course may be repeated for credit with instructor consent.

**Hours & Format**
Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

**Additional Details**
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Instructor: Michael Silver
Introduction to Visual Neuroscience: Read Less [-]
VIS SCI 260D Seeing in Time, Space and Color 3 Units
Terms offered: Spring 2020, Spring 2019, Spring 2018
The course will provide an overview of how we see in time (temporal signal processing, eye motion, motion detection), space (stereo vision, depth perception), and color as well as the anatomical and physiological factors that facilitate these capabilities. The course will be series of didactic lectures. This is one of the four courses that form the Vision Science core curriculum

Rules & Requirements
Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructor: Martin Banks

VIS SCI 262 Visual Cognitive Neuroscience 3 Units
Terms offered: Fall 2018, Spring 2016, Spring 2015
The course will provide an overview of visual cognitive neuroscience, drawing from neuroanatomy, neurophysiology in humans and animal models, psychophysics, neuroimaging, neuropharmacology, neuropsychology, and computational models of vision and cognition. Topics will include basic anatomy and physiology of the mammalian visual system, motion perception and processing, depth perception and representation of visual space, brightness and color, object and face recognition, visual attention, developmental and adult plasticity, perceptual learning, multisensory integration, and visual awareness.

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructor: Silver

VIS SCI 265 Neural Computation 3 Units
Terms offered: Fall 2020, Fall 2018, Fall 2016
This course provides an introduction to the theory of neural computation. The goal is to familiarize students with the major theoretical frameworks and models used in neuroscience and psychology, and to provide hands-on experience in using these models. Topics include neural network models, supervised and unsupervised learning rules, associative memory models, probabilistic/graphical models, and models of neural coding in the brain.

Rules & Requirements
Prerequisites: Calculus, differential equations, basic probability and statistics, linear algebra, and familiarity with high level programming languages such as Matlab

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructor: Olshausen

VIS SCI C265 Neural Computation 3 Units
Terms offered: Prior to 2007
This course provides an introduction to the theory of neural computation. The goal is to familiarize students with the major theoretical frameworks and models used in neuroscience and psychology, and to provide hands-on experience in using these models. Topics include neural network models, supervised and unsupervised learning rules, associative memory models, probabilistic/graphical models, and models of neural coding in the brain.

Rules & Requirements
Prerequisites: Calculus, differential equations, basic probability and statistics, linear algebra, and familiarity with high level programming languages such as Matlab

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructor: Olshausen

Also listed as: NEUROSC C265
VIS SCI C280 Computer Vision 3 Units
Terms offered: Spring 2020, Spring 2019, Spring 2018

Computer Vision: Read More [+]

Rules & Requirements
Prerequisites: Knowledge of linear algebra and calculus. Mathematics 1A-1B, 53, 54 or equivalent

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.
Instructor: Malik

Also listed as: COMPSCI C280

VIS SCI 298 Group Studies, Seminars, or Group Research 1 - 6 Units
Terms offered: Fall 2020, Spring 2020, Fall 2019
Group studies of selected topics. Advanced studies in various subjects through special seminars on topics to be selected each year, informal groups studying special problems, group participation in experimental problems and analysis.

Group Studies, Seminars, or Group Research: Read More [+]

Rules & Requirements
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 2-6 hours of lecture per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Group Studies, Seminars, or Group Research: Read Less [-]

VIS SCI 299 Research in Vision Science 1 - 12 Units
Terms offered: Fall 2020, Summer 2020 Second 6 Week Session, Spring 2020
Research.

Research in Vision Science: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor

Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Summer:
6 weeks - 1-16 hours of independent study per week
8 weeks - 1-12 hours of independent study per week

Additional Details
Subject/Course Level: Vision Science/Graduate
Grading: Letter grade.

Research in Vision Science: Read Less [-]

VIS SCI 300 Teaching Methods in Vision Science 1 Unit
Terms offered: Fall 2020, Spring 2020, Fall 2019
Instruction in teaching methods and materials, in vision science and optometry; practice teaching in classrooms and laboratory.

Teaching Methods in Vision Science: Read More [+]

Rules & Requirements
Prerequisites: Graduate standing in vision science
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details
Subject/Course Level: Vision Science/Professional course for teachers or prospective teachers
Grading: Offered for satisfactory/unsatisfactory grade only.
Instructor: Silver

Teaching Methods in Vision Science: Read Less [-]
VIS SCI 601 Individual Study for Master's Students 1 - 6 Units
Terms offered: Spring 2020, Spring 2019, Spring 2018
Individual study for the comprehensive requirements in consultation with the adviser in vision science.
Individual Study for Master's Students: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor
Credit Restrictions: Course does not satisfy unit or residence requirements for master's degree.
Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Additional Details
Subject/Course Level: Vision Science/Graduate examination preparation
Grading: Offered for satisfactory/unsatisfactory grade only.
Individual Study for Master's Students: Read Less [-]

VIS SCI 602 Individual Study for Doctoral Students 1 - 6 Units
Terms offered: Fall 2020, Spring 2020, Fall 2019
Individual study in consultation with the adviser in vision science, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for the Ph. D.
Individual Study for Doctoral Students: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor
Credit Restrictions: Course does not satisfy unit or residence requirements.
Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Additional Details
Subject/Course Level: Vision Science/Graduate examination preparation
Grading: Offered for satisfactory/unsatisfactory grade only.
Individual Study for Doctoral Students: Read Less [-]