Course guide
370009 - OTIVIS - Visual Optics

Last modified: 20/03/2024

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 731 - OO - Department of Optics and Optometry.

Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Pujol Ramo, Jaume (https://futur.upc.edu/JaumePujolRamo)

Others: Tàpias Anton, Montserrat (https://futur.upc.edu/MontserratTapiasAnton)
Alvarez Muñoz, José Luis (https://futur.upc.edu/JoseLuisAlvarezMunoz)

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.

Generical:
CG9. Expand and update one’s professional abilities through continuing education.
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.

Transversal:
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

Angles

STUDY LOAD

Type	Hours	Percentage
Hours medium group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

title english

Description:
content english

Full-or-part-time: 1h 45m
Practical classes: 1h
Self study : 0h 45m

title english

Description:
content english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.

Full-or-part-time: 20h
Practical classes: 6h
Laboratory classes: 6h
Self study : 8h

title english

Description:
content english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.

Full-or-part-time: 17h
Practical classes: 6h
Laboratory classes: 4h
Self study : 7h

title english

Description:
content english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.

Full-or-part-time: 35h 45m
Practical classes: 17h
Laboratory classes: 3h
Self study : 15h 45m

title english

Description:
content english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.

Full-or-part-time: 23h
Practical classes: 11h
Laboratory classes: 2h
Self study : 10h

title english

Description:
content english

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CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.

Full-or-part-time: 7h
Practical classes: 4h
Self study : 3h

ACTIVITIES

name english

Related competencies :
CG9. Expand and update one's professional abilities through continuing education.
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 3h
Laboratory classes: 2h
Self study: 1h

name english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 3h
Laboratory classes: 2h
Self study: 1h

name english

Related competencies :
CG9. Expand and update one's professional abilities through continuing education.
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.

Full-or-part-time: 3h
Laboratory classes: 2h
Self study: 1h

name english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 3h
Laboratory classes: 2h
Self study: 1h

name english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
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CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 3h
Laboratory classes: 2h
Self study: 1h

name english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
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CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 1h 30m
Laboratory classes: 1h
Self study: 0h 30m

name english

Related competencies :
CG9. Expand and update one's professional abilities through continuing education.
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
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Full-or-part-time: 12h 45m
Practical classes: 2h
Self study: 10h 45m

name english

Related competencies :
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
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CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.

Full-or-part-time: 28h 30m
Practical classes: 2h
Self study: 26h 30m

name english

Related competencies :
CG9. Expand and update one's professional abilities through continuing education.
CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE13. Understand the factors that limit retinal image quality. Demonstrate knowledge of the spatial and temporal aspects of vision. Carry out psychophysical tests to determine levels of visual perception. Demonstrate knowledge of the functioning of the retina as a receptor of radiant energy. Demonstrate knowledge of the basic models of vision of colour, shape and movement. Demonstrate knowledge of age-related changes in perceptual processes. Measure and interpret psychophysical data obtained from an assessment of visual perception.
CE06. (ENG) The ability to recognise the eye as an optical system. The ability to understand the basic models of vision. The ability to understand ocular models and parameters.

Full-or-part-time: 8h 30m
Practical classes: 1h
Self study: 7h 30m

name english

Full-or-part-time: 1h
Laboratory classes: 1h

name english

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CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG9. Expand and update one's professional abilities through continuing education.
CE12. Understand and make use of techniques for analysing, measuring, correcting and monitoring the effects of compensatory optical systems on the visual system in order to optimise their design and fit. Make use of the techniques of centring, fitting, mounting and adjusting on all kinds of optometrically prescribed lenses, visual aids and protective eyewear. Prescribe, monitor and follow up with optical corrections. Identify and analyse environmental and workplace risk factors that could lead to visual issues.
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CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 2h
Practical classes: 2h

name english

Full-or-part-time: 60h
Practical classes: 60h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:
- Le Grand, Yves. Optica fisiológica. Vol. 1, El ojo como instrumento óptico. Madrid: Asociación de amigos de las Escuelas de Óptica, 1991. ISBN 8460400158.
- Rabbets, Ronald B. Clinical visual pptics. 4th. Edinburgh: Butterworth-Heinemann, 2007. ISBN 9780750688741.
- Viqueira Pérez, Valentín; Martínez-Verdú, Francisco Miguel; Fez, Dolores de. Óptica fisiològica : modelo paraxial y compensación óptica del ojo [on line]. Sant Vicente del Raspeig: Publicaciones de la Universidad de Alicante, 2003 [Consultation: 13/05/2022]. Available on: https://web-p-ebscohost-com.recursos.biblioteca.upc.edu/ehost/ebookviewer/ebook?sid=605dfc7a-57a3-4df0-84c5-7d7927e0a140%40redis&vid=0&format=EB. ISBN 8479087757.
- Schwartz, Steven H. Geometrical and visual optics : a clinical introduction. New York: Mac-Graw-Hill, 2002. ISBN 0071374159.
- Keating, Michael P. Geometric, physical and visual optics. 2nd ed. Boston [etc.]: Butterworth-Heinemann, 2002. ISBN 9780750672627.
- Artal, Pablo. Handbook of visual optics. Boca Raton: CRC Press, 2017. ISBN 9781482237856.

Complementary:
- Tunnacliffe, Alan H. Introduction to visual optics. 4th ed. London: The Association of British Dispensing Opticians, 1993. ISBN 0900099283.
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- Artigas, J. M [et al.]. Óptica fisiológica : psicofísica de la visión. Madrid: McGraw-Hill Interamericana, 1995. ISBN 8448601157.
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- Keirl, Andrew; Christie, Caroline. Clinical optics and refraction : a guide for optometrists, contact lens opticians and dispensing opticians. [Kent]: Baillière Tindall, 2007. ISBN 9780750688895.
- Fannin, Troy E.; Grosvenor, Theodore. Clinical optics. 2nd ed. Boston [etc.]: Butterworth-Heinemann, 1996. ISBN 0750696702.