

# Course guide

## 370022 - CONBASICA - Basic Contact Lens

**Last modified:** 21/03/2024

**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, English

### LECTURER

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**Coordinating lecturer:** Cardona Torradeflot, Genis (<http://futur.upc.edu/GenisCardonaTorradeflot>)

**Others:**

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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#### Specific:

CE11. Describe the physical and chemical properties of the materials used in the field of optics and optometry.

CE23. Describe the properties of the types of contact lenses and ocular prostheses. Describe the geometry and physical-chemical properties of contact lenses and associate them with specific ocular and refractive characteristics. Identify and use clinical and instrumental protocols associated with fitting contact lenses. Identify the solutions used for maintenance, diagnosis and treatment and associate them with lenticular and ocular characteristics. Apply the clinical procedures associated with contact lens fitting to various refractive and ocular dysfunctions. Apply the controlled modification techniques of corneal topography with the use of contact lenses. Detect, assess and resolve abnormalities associated with the use of contact lenses. Adapt contact lenses and ocular prostheses to improve vision and the outer appearance of the eye.

#### Generical:

CG1. Demonstrate knowledge of, design and apply prevention and maintenance programmes relating to the population's visual health.

CG2. Carry out each stage of visual examinations effectively: medical history, selection and implementation of diagnostic tests, establishment of a prognosis, selection and execution of treatment and, if necessary, preparation of referral reports that establish levels of collaboration with other professionals, to ensure the best possible care for the patient.

CG4. Critically reflect on the clinical, scientific, ethical and social issues involved in the professional practice of optometry, understand the scientific foundations of optics and optometry and critically evaluate terminology, clinical trials and research methods related to optics and optometry.

CG8. Plan and carry out research projects that contribute to the production of knowledge in the field of optometry and disseminate this scientific knowledge via the typical communication channels.

#### Transversal:

CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.

CT7. Foreign language. Demonstrate knowledge of a foreign language, preferably English, at an oral and written level that is consistent with graduates' future needs.

CT3. Teamwork. To be able to work as a member of a multidisciplinary team, either as a base member or undertaking managerial decisions aiming at developing projects from a practical and responsible standpoint, adopting commitments given the available resources

## TEACHING METHODOLOGY

The methods that are used are:

MD1 - Participatory lecture on theory and problems

MD3 - Practical problem-solving class requiring student participation in case studies and/or exercises on topics related to the subject matter

MD4 - Laboratory practicals

MD6 - Completing problems, exercises and assignments and resolving doubts via the ATENEA virtual campus

MD7 - Tutorials

The subject consists of 15 two-hour sessions of lectures and 15 two-hour sessions of laboratory practicals. In addition, various independent learning (individual or group) tasks are completed by the students.

To progress in the course, students must follow the instructions and abide by the deadlines given in the virtual campus ATENEA.

## LEARNING OBJECTIVES OF THE SUBJECT

On completion of the subject Basic Contactology, students must be able to:

- Demonstrate knowledge of the properties of types of contact lenses.
- Demonstrate knowledge of the geometry and physical-chemical properties of contact lenses and associate them with specific ocular and refractive characteristics.
- Identify and use clinical and instrumental protocols associated with fitting contact lenses.
- Demonstrate knowledge of maintenance solutions and their safe and efficient use in contactology.
- Demonstrate knowledge of the procedures for fitting and assessing corneal hard lenses and spherical soft lenses.

## STUDY LOAD

Type	Hours	Percentage
Hours medium group	30,0	20.00
Self study	90,0	60.00
Hours small group	30,0	20.00

**Total learning time:** 150 h

## CONTENTS

### T1. Introduction to contact lenses

**Description:**

1.1 Terminology used in contactology

1.2 History of contactology

**Full-or-part-time:** 5h

Theory classes: 1h

Self study : 4h



## T2. Ocular surface evaluation

### Description:

- 2.1 Anatomy and physiology of the cornea and ocular adnexa
- 2.2 Keratometry and ocular topography
- 2.3 Qualitative and quantitative evaluation of the tear film
- 2.4 Corneal esthesiometry

This topic covers:

Anatomical description of anterior ocular structures and detailed explanation of tools and methods used to measure their main parameters as the basis for the future choice of type of contact lens that is most suitable for each patient.

### Related activities:

- Practical 1: Keratometry and topography (P1)
- Practical 6: Biomicroscopy (P6)

**Full-or-part-time:** 20h

Theory classes: 3h

Laboratory classes: 3h

Self study : 14h

## T3. Contact lens materials and maintenance solutions

### Description:

- 3.1 Materials used to manufacture contact lenses
- 3.2 Deposits on contact lenses
- 3.3 Systems for looking after and maintaining contact lenses

This topic covers:

Description of materials used for the manufacture of contact lenses and their characteristics, as well as the deposits that form on their surfaces and the care and maintenance systems used to clean and disinfect lenses.

### Related activities:

These will be carried out in practical sessions 7 and 8 corresponding to the identification of contact lens parameters and the study of care and maintenance solutions (P7, P8).

After this section, a first assessment of theoretical content will be carried out (E1).

**Full-or-part-time:** 32h

Theory classes: 5h

Practical classes: 3h

Self study : 24h

#### T4. Geometry and parameters of contact lenses

**Description:**

- 4.1 Geometry and design of RGP contact lenses
- 4.2 Geometry and design of hydrogel contact lenses
- 4.3. Verification of parameters of RGP contact lenses
- 4.4. Verification of parameters of hydrogel contact lenses
- 4.5. Manufacture of RGP contact lenses
- 4.6. Manufacture of hydrogel contact lenses

This topic covers:

Description of different designs of RGP and hydrogel contact lenses and methods used to verify their parameters. Short topic on manufacture of RGP and hydrogel contact lenses.

**Related activities:**

Practical sessions 2 and 3 on the verification of parameters of rigid corneal lenses and hydrogel lenses (P2, P3)

**Full-or-part-time:** 18h

Theory classes: 3h

Laboratory classes: 1h

Self study : 14h

#### T5. Contact lens optics and preliminary exams

**Description:**

- 5.1. Optics of the system formed by the eye and the contact lens
- 5.2. Preliminary examination for the fitting of types of contact lenses

This topic covers:

All the content worked on in previous topics is brought together to address the optical effect in the fitting of a contact lens for different refractive errors. Initial approach to the preliminary examinations required for all contact lens fittings.

**Related activities:**

They will be carried out in practical sessions 4 and 5, corresponding to the measurement of ocular parameters and assessment of the tear film (P4, P5), and practical sessions 9 and 10, corresponding to the fitting of hard corneal and hydrogel contact lenses (P9, P10).

**Full-or-part-time:** 36h

Theory classes: 5h

Laboratory classes: 7h

Self study : 24h

#### T6. Fitting of rigid corneal and soft spherical lenses

**Description:**

- 6.1. Fitting and assessment of rigid corneal spherical lenses.
- 6.2. Fitting and assessment of soft spherical lenses.

**Related activities:**

Practical sessions 9 and 10, corresponding to the fitting of corneal hard and hydrogel contact lenses (P9, P10).

The final exam will be carried out at the end of the course (E2).

**Full-or-part-time:** 39h

Theory classes: 13h

Laboratory classes: 16h

Self study : 10h



## ACTIVITIES

### Lab1. Keratometry, Topography and Slit-lamp examination

**Description:**

P1. Measurement and critical analysis of keratometric and topographic parameters of the cornea  
P6. Examination of the anterior segment using biomicroscopy

**Specific objectives:**

- Carefully carry out corneal radius measurements with different types of keratometers and with the topographs that are available in the laboratory.
- Demonstrate ability with lighting techniques for examination of the anterior segment using a biomicroscope.

**Material:**

Keratometers, topographs and biomicroscopes  
practical file.

**Delivery:**

Completed handout

**Full-or-part-time:** 11h

Laboratory classes: 5h

Self study: 6h

### Lab2. Contact lens parameters

**Description:**

P2. Measurement and verification of parameters (radius, diameter, power, etc.) of corneal hard contact lenses  
P3. Measurement and verification of parameters (radius, diameter, power, etc.) of soft contact lenses (P3)

**Specific objectives:**

- Demonstrate knowledge of methods and limitations in the measurement and verification of parameters of corneal hard contact lenses.
- Demonstrate knowledge of methods and limitations in the measurement and verification of parameters of soft contact lenses.

**Material:**

Instrumentation for measuring parameters of contact lenses  
Contact lenses of different materials and design  
Practicals file

**Delivery:**

Completed handout

**Full-or-part-time:** 7h

Practical classes: 3h

Self study: 4h



### Lab3. Contact lens materials and maintenance solutions

**Description:**

P7. Various types of current contact lenses are revised to determine and compare properties (permeability to oxygen, water content, rigidity, etc.).

P8. Types of cleaning and maintenance solutions are evaluated to explore their composition and mode of action.

**Specific objectives:**

- Demonstrate knowledge of the physical-chemical properties of materials used in current contact lenses.
- Demonstrate knowledge of the composition and method of action of current maintenance solutions.

**Material:**

Current contact lenses  
Current maintenance solutions  
Practicals file

**Delivery:**

Completed handout

**Full-or-part-time:** 9h

Laboratory classes: 3h

Self study: 6h

### Lab4. Ocular parameters and fitting of contact lenses

**Description:**

P4. Measurement of parameters of the anterior segment

P5. Qualitative and volumetric evaluation of the tear film

P9. Fitting and first assessment of corneal hard contact lenses

P10. Fitting and first assessment of soft contact lenses

**Specific objectives:**

- Demonstrate knowledge of techniques for the measurement of parameters of the anterior segment and the tear film and how these parameters determine the initial selection of the contact lens.
- Use manual skills for the insertion and removal of hard and soft contact lenses and for their care and maintenance.
- Assess the fitting of corneal hard and spherical soft contact lenses.

**Material:**

Contact lenses, instruments for measuring the parameters of the anterior segment and the tear film, maintenance solutions.  
Practicals file.

**Delivery:**

Completed handout.

**Full-or-part-time:** 33h

Laboratory classes: 19h

Self study: 14h

### Written tests

**Description:**

E1. First written exam (T1, T2 and T3)

E2. Second written exam (T1, T2, T3, T4, T5 and T6)

**Full-or-part-time:** 9h

Theory classes: 3h

Self study: 6h



### European Diploma competencies

#### Description:

The subject Basic Contactology contributes fully or partially to the following European Diploma competencies:

- B11. Contact Lenses. Theory and practice. (1) Treatment and management of refractive/oculomotor/sensory integrative conditions using contact lenses, which is worked on in Topic T5 (1.2) and has a weight of 0.4 ECTS credits.
- B11. Contact Lenses. Theory and practice. (2) Lens types and materials: hard lenses; haptics; lathe-cut, moulded, and spin-cast soft lenses, which is worked on in Topic T3 (1) and P7 and has a weight of 0.6 ECTS credits.
- B11. Contact Lenses. Theory and practice. (3) Optics of contact lenses: curves, zones, widths and tear lens effects, sagittal depth; centre and edge thickness; flex, asphericity and toric designs and quadrantic specific designs, and oblong geometries with reverse curves, which is worked on in Topic T5 (1) and P4 and has a weight of 0.4 ECTS credits.
- B11. Contact Lenses. Theory and practice. (4) Theories and methods of fitting: lens design, specifications of orders, lens verification and evaluation, insertion and removal techniques, design of wearing schedules, fluorescein evaluation and fitting criteria, which is worked on in Topic T5 (2), T6 (1.2) and P2, P3, P9 and P10, and has a weight of 1.2 ECTS credits.
- B11. Contact Lenses. Theory and practice. (5) Patient selection based upon history, analysis of primary care data, correlations of data, facial physiognomy, and contraindications; and management based upon education and patient handling and control, the examination of a new prospective contact lens patient, the anterior segment examination and measurement, which is worked on in Topic P1, P4 and P5 and has a weight of 0.8 ECTS credits.  
which focuses on the topic in Unit 4 and has a weight of 1.2 ECTS credits.
- B11. Contact Lenses. Theory and practice. (8) Care of lenses; handling; cleaning; preservatives available; disinfection methods and solutions, which is worked on in Topic T3 (2.3) and P8 and has a weight of 0.4 ECTS credits.
- B11. Contact Lenses. Theory and practice. (9) Follow-up care; adaptation, physiologic and post-fitting complications, allergic responses, lens changes and mechanical problems, which is worked on in Topic P9, P10 and has a weight of 0.2 ECTS credits.
- B11. Contact Lenses. Theory and practice. The ability to insert and remove rigid gas permeable and soft contact lenses and instruct patients in these procedures, which is worked on in Topic P9, P10 and has a weight of 0.2 ECTS credits.
- B11. Contact Lenses. Theory and practice. The ability to fit soft contact lenses, which is worked on in Topic P10 and has a weight of 0.2 ECTS credits.
- B11. Contact Lenses. Theory and practice. The ability to fit rigid gas permeable contact lenses, which is worked on in Topic P9 and has a weight of 0.2 ECTS credits.
- B 12B: Investigative Techniques. Theory and practice. The ability to assess the tear film, which is worked on in Topic T2 (3) and P6 and has a weight of 0.2 ECTS credits.
- C 12C: Investigative Techniques. Theory and practice. (1) slit lamp examination of the external and internal eye, which is worked on in Topic P5 and has a weight of 0.2 ECTS credits.

**Full-or-part-time:** 54h

Theory classes: 24h

Laboratory classes: 30h

### Assessment of cross-disciplinary competencies

#### Description:

Cross-disciplinary competences associated with the subject are assessed jointly with the submission of the practical files (CT7 and CT3) and the written exams (CT6).

**Full-or-part-time:** 4h

Theory classes: 3h

Practical classes: 1h

## GRADING SYSTEM

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Two exams shall be programmed E1 and E2 (total 70%) assessing the whole syllabus in both.

First written exam E1 (30%)

Second written exam E2 (40%)

Lab sessions will be assessed according to the work of the students (20%) and several tasks will be programmed (total 10%)

Reassessment: Students may opt to a reassessment exam (100%) only if they have a 3 or more as a total mark and if they have a 5 or more in the qualification of the lab sessions.

## EXAMINATION RULES.

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- Required attendance to all activities requiring evaluation.
- Any of the activities without attendance shall be graded a 0.
- The subject will not be passed if the lab qualification is less than 5 (over 10).

## BIBLIOGRAPHY

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### Basic:

- Hom, Milton M. Manual de prescripció y adaptaci3n de lentes de contacto. 3a ed. Barcelona: Elsevier Masson, 2007. ISBN 9788445817605.
- Efron, Nathan. Contact lenses A-Z. Oxford: Butterworth-Heinemann, 2002. ISBN 0750653027.
- Richdale, K. [et al.]. "BCLA CLEAR - Contact lens optics". Contact lens and anterior eye [on line]. 2021, vol. 44, núm. 2, p. 220-239 [Consultation: 10/05/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1367048421000199>.
- Wolffsohn, J.S. [et al.]. "BCLA CLEAR - Evidence-based contact lens practice". Contact lens and anterior eye [on line]. 2021, vol. 44, núm. 2, p. 368-397 [Consultation: 10/05/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1367048421000229>.
- Willcox, Mark [et al.]. "BCLA CLEAR - Contact lens wettability, cleaning, disinfection and interactions with tears". Contact lens and anterior eye [on line]. 2021, vol. 44, núm. 2, p. 157-191 [Consultation: 10/05/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1367048421000187>.
- Morgan Philip B. [et al.]. "BCLA CLEAR - Effect of contact lens materials and designs on the anatomy and physiology of the eye". Contact lens and anterior eye [on line]. 2021, vol. 44, núm. 2, p. 192-219 [Consultation: 10/05/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1367048421000205>.
- Downie Laura E. [et al.]. "BCLA CLEAR - Anatomy and physiology of the anterior eye". Contact lens and anterior eye [on line]. 2021, vol. 44, núm. 2, p. 132-156 [Consultation: 10/05/2022]. Available on: <https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1367048421000230>.

## RESOURCES

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### Hyperlink:

- Contact Lens Spectrum. <https://www.clspectrum.com/>- Pubmed. <https://pubmed.ncbi.nlm.nih.gov/?term=contact+lenses>- Web cursos formaci3n Con3ptica. <https://www.youtube.com/channel/UCtoCgClKK1eo6KbVMPwAG7Q>- Youtube Tear Film Ocular Surface (TFOS). <https://www.youtube.com/user/TearFilmSociety/videos>- Revista Contact Lens Anterior Eye Abril 2021 CLEAR Report. CLEAR Report with up-to-date scientific evidence of all aspects of contact lens fitting

### Other resources:

The teacher will make various articles for voluntary or compulsory reading available to the students, as well as the corresponding presentations made in class through the ATENEA portal.