# Advances in Clinical Biochemistry and Molecular Pathology

Code: 42886
ECTS Credits: 9

2024/2025

| Degree | Type | Year |
|---|---|---|
| 4313794 Biochemistry, Molecular Biology and Biomedicine | OT | 0 |

## Contact

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## Teachers

Francesca Canalias Reverter

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(External) Joan Carles Escolà Gil

(External) José Luis Sánchez Quesada

(External) José Manuel Soria Fernandez

(External) Mireia Tondo Colomer

(External) Noemi Rotllan Vila

## Teaching groups languages

You can view this information at the end of this document.

## Prerequisites

1) Having the Degree, preferably in Life Sciences and Health (Biomedicine, Biochemistry, Genetics, Medicine, Veterinary Medicine, Pharmacy, etc.)
2) Good level of Spanish, and English. Spanish will be used as we do have students from other parts of Spain and South America. English will be used for sure for reading scientific information.

## Objectives and Contextualisation

The main objective of the module is reviewing the progress recently made by the specialiality of Clinical Biochemistry and Molecular Pathology. It is intended, therefore, that students visualize this using examples,

that are not intended to be exhaustive. The goal is that they understand how some applications in this area of Laboratory Medicine were generated and applied. The contents will be selected among those advances which, although recent, have proven of practical importance. The theoretical instruction is supplemented by expert seminars, discussion of articles and resolution of clinical cases.

## Competences

- Analyse and correctly interpret the molecular mechanisms operating in living beings and identify their applications.
- Analyse and explain normal morphology and physiological processes and their alterations at the molecular level using the scientific method.
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Continue the learning process, to a large extent autonomously.
- Develop critical reasoning within the subject area and in relation to the scientific or business context.
- Identify and propose scientific solutions to problems in molecular-level biological research and show understanding of the biochemical complexity of living beings.
- Identify and use bioinformatic tools to solve problems in biochemistry, molecular biology and biomedicine.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
- Use scientific terminology to account for research results and present these orally and in writing.

## Learning Outcomes

1. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
2. Continue the learning process, to a large extent autonomously.
3. Develop critical reasoning within the subject area and in relation to the scientific or business context.
4. Evaluate and implement improvements or changes, either in methods or parameters, in the clinical laboratory.
5. Identify the main new trends within clinical biochemistry and molecular pathology and understand how these depend largely on the application of new methods and technologies.
6. Identify, from examples, the practical applications of new methodological and interpretative advances in laboratory medicine.
7. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
8. Interpret results from clinical analyses on different groups of pathologies and their sequential implementation following pre-established algorithms.
9. Recognize and explain the special characteristics and requirements of the biochemical and genetic analyzes carried out in clinical laboratories.
10. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
11. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
12. Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
13. Use bioinformatic tools to process genome data for research or laboratory diagnosis of human diseases.
14. Use scientific terminology to account for research results and present these orally and in writing.

## Content

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| M9 |
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| PRESENTATION. POTENTIAL ACADEMIC AND PROFESSIONAL OUTCOMES IN CLIN BIOCH AND MOL PATHOL |
| UPDATE EN LIPIDS AND LIPOPROTEINS (topic 1) |
| STANDARDIZATION AND QUALITY (topic 2) |
| Standardization and quality |
| Standardization and quality (questions relative to topic 2) |
| SEMINAR I. Mass spectrometry: bases annd clinical applications |
| INBORN ERRORS OF METABOLISM (topic 3) |
| CLINICAL BIOCHEMISTRY OF THE ADRENAL CORTEX (topic 4) |
| PRENATAL SCREENING (topic 5). Questions relative to topics 3, 4 and 5 (second part) |
| ONCOLOGY (topic 6): Diagnosis of inherired cancer / Detection of plasma free tumoral DNA |
| ONCOLOGY: Tumor Markers. Discussion of clinical cases and/or papers, questions relative to topic 6 |
| BIOCHEMICAL MARKERS OF CARDIAC DAMAGE (topic 7). Biochemical diagnosis of acute myocardial infarction. Bioche |
| SEMINARS II-III. Animal models animals of arteriosclerosis / Molecular and Cellular Biology of arteriosclerosis |
| SEMINARS IV-V- MicroRNAs en cardiovascular research / Questions relative to topics 1, 7 and seminars (second part) |
| BIOCHEMICAL DIAGNOSIS OF ALZHEIMER'S DISEASE AND OTHER NEUROLOGICAL DISEASES (topic 8). |
| CLOSING CONFERENCE: Molecular bases of complex diseases |
| Presentation of scientific papers or clinical cases by the alumni |
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| Presentation of scientific papers or clinical cases by the alumni |

## Activities and Methodology

| Title | Hours | ECTS | Learning Outcomes |
|---|---|---|---|
| Type: Directed | | | |
| theoretical lessons, seminars, aula practicum: 45 h | 7.5 | 0.3 | 4, 3, 5, 6, 8, 7, 10, 2, 9, 11 |

| | | | |
|---|---|---|---|
| theoretical lessons, seminars, aula practicum: 45 h | 15 | 0.6 | 4, 5, 6, 8, 7, 10, 1, 2, 9, 13, 11, 12, 14 |
| theoretical lessons, seminars, aula practicum: 45 h | 22.5 | 0.9 | 4, 5, 7, 2, 9, 11 |
| Type: Supervised | | | |
| Study of clinical cases and reading scientific papers for class discussion: 67.5 h | 67.5 | 2.7 | 4, 3, 5, 6, 8, 7, 10, 1, 2, 9, 13, 11, 12, 14 |
| Type: Autonomous | | | |
| Study: 106.5 h | 106.5 | 4.26 | 4, 3, 5, 6, 8, 7, 10, 2, 9, 13, 11, 12, 14 |

Methodology includes autonomous activities (studying: 106.5 h), supervised activities (study of clinical cases and reading scientific papers for class discussion: 67.5 h) and directed activities (theoretical lessons, seminars, aula practicum: 45 h).

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Assessment

## Continous Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|---|---|---|---|---|
| Attendance and active participation in classes | 30% | 0 | 0 | 4, 3, 5, 6, 8, 7, 10, 1, 2, 9, 13, 11, 12, 14 |
| Oral presentation of projects or clinical cases | 40% | 4 | 0.16 | 4, 3, 6, 8, 7, 10, 1, 2, 9, 11, 12, 14 |
| Presentation of homework and reports, small exams of short questions (in writing) | 30% | 2 | 0.08 | 3, 6, 8, 7, 10, 1, 2, 11, 12, 14 |

*Unique evaluation will not be applied.*

*The continous evaluation process must include a minimum of three evaluation activities, of two different types, distributed throughout the course, none of which can represent more than 50% of the final grade*

The evaluation will be based on: oral presentation of projects or clinical cases analysis (40% of the grade), presentation of small works and reports, as well as the answer to short exams (30% of the grade) and attendance to class and active participation (30 % of the grade)

Students who do not perform both theoretical and practical tests will be considered as "not presented", therrefore exhausting the rights of the registration.

If plagiarism is detected in any of the works delivered, this may mean that the student suspends the entire module or subject.

PROOF OF RECOVERY AND QUALIFICATION OF NOT EVALUABLE

To participate in exam recovery, students must have been previously evaluated in a set of activities, whose weight equals a minimum of 2/3 parts of the total grade of the subject or module. Therefore, the students will obtain a "Not Evaluable" qualification when the evaluation activities carried out have a weight lower than 67% of the final grade.

## Bibliography


TEXTBOOKS:

1) Tietz texbook of Clinical Chemistry and Molecular Diagnostics. Burtis CA, Ashwood ER, Bruns DE eds. Elsevier, 2014.

2) Molecular Basis of Inherited Disease. Valle, Beaudet, Vogelstein et al. Saunders 2001 (digital edition with timely actualization: https://ommbid.mhmedical.com/ommbid-index.aspx).

SCIENTIFIC JOURNALS (Some of these journals allow public or limited access through intenet, or through the UAB website*):

1) Clinical Chemistry. http://search.ebscohost.com/direct.asp?db=ccm&jid=%2210CS%22&scope=site

2) Clinica Chimica Acta, https://www.sciencedirect.com/science/journal/00098981

3) Clinical Biochemistry, https://www.sciencedirect.com/science/journal/00099120

4) Circulation, http://ovidsp.ovid.com/ovidweb.cgi?T=JS&MODE=ovid&NEWS=n&PAGE=toc&D=ovft&AN=00003017-00000000

5) Blood, https://ashpublications.org/blood/issue-covers/volume/

6) Journal of Lipid Research, http://www.jlr.org/

7) New England Journal of Medicine, http://www.nejm.org/

8) Lancet, http://search.ebscohost.com/direct.asp?db=ccm&jid=%22LAN%22&scope=site

9) Journal of Clinical Investigation, http://www.jci.org/

1) Cell Metabolism, http://www.cell.chttp://www.jci.orgom/cell-metabolism/redirectUrl/

12) Nature Medicine, http://www.nature.com/nm/index.html

14) Cancer Research, http://cancerres.aacrjournals.org/

*For more information, go to the digital UAB library M9 page: https://catalegclassic.uab.cat/search~S1*spi?/pBLANCO+VACA%2C+FRANCISCO/pblanco+vaca+francisco/-3%

SCIENTIFIC CLINICAL LABORATORY SOCIETY WEBSITES:

1) American Association for Clinical Chemistry, www.aacc.org

2) Associació Catalana de Ciències de Laboratori Clínic, www.acclc.cat

3) International Federation of Clinical Chemistry and Laboratory Medicine, www.ifcc.org

4) Sociedad española de Química Clínica y Patología Molecular, www.seqc.es

## Software

No especific software is used

## Language list

| Name | Group | Language | Semester | Turn |
|---|---|---|---|---|
| (PAULm) Classroom practices (master) | 1 | Spanish | annual | afternoon |
| (SEMm) Seminars (master) | 1 | Spanish | annual | afternoon |
| (TEm) Theory (master) | 1 | Spanish | annual | afternoon |