# Cellular Signalling

Code: 107994
ECTS Credits: 3

2025/2026

| Degree | Type | Year |
|---|---|---|
| Biochemistry | OB | 3 |

## Contact

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## Teaching groups languages

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

## Prerequisites

Basic knowledge and competences of Biochemistry, Cell Biology, Physiology and Histology, Chemistry, Mathematics, Physics.

## Objectives and Contextualisation

The subject of Cell Signaling is included in the matter Biochemistry Functional . A subject of this matter has been studied during the second year, the others will be studied during this third year.

The behavior of a cell depends on the physiological situation in which it is found. This process requires the cell to have sensors of the external stimuli and respond appropriately to these stimuli. This process of recognition of the stimulus and response of the cell is known as cell signaling or signal transduction.

In this subject, the nature of the signal molecules and the mechanisms by which the cells recognize these molecules and respond appropriately to them will be studied.

Targets

Describe the molecules involved in intracellular and intracellular communication systems.

Have an integrated vision of the function of hormones, neurotransmitters and growth factors in the control of gene expression.

Explain the signal transduction pathways involved in the regulation of the cell cycle, apoptosis and cancer.

To know the experimental approaches to the study of signal transduction mechanisms.

Search bibliography and interpret information of biological signal transmission databases.

Interpreting experimental results and identifying the consistent and inconsistent elements.

Read specialized texts in the English language.

Know how to make an oral and visual presentation of a topic related to the subject to classmates.

## Learning Outcomes

1. CM25 (Competence) Understand metabolic pathways, catalytic and regulatory mechanisms, and energy-gathering processes involved in meeting physiological demands.
2. CM26 (Competence) Deliver a public presentation of an advanced biochemistry topic.
3. KM29 (Knowledge) Describe intercellular and intracellular communication systems, as well as metabolic pathways, their interconnections, and physiological significance.
4. SM28 (Skill) Apply bioinformatics resources when searching databases on enzymes, metabolic pathways and pathological alterations, and to calculate enzyme kinetic parameters.
5. SM30 (Skill) Critically analyse measurable experimental parameters in tissues in normal or pathological physiological conditions and in the quantification of metabolic control.

## Content

THEORY

Topic 1. Characteristics of cell signaling.

Topic 2. Basic biochemistry of signal transduction.

Topic 3. Basic equipment: G proteins, according to messengers and protein kinases

Topic 4.Signal Transduction by Receptors with Seven Transmembrane Domains

Topic 5. Signal Transduction by Serine/Threonine Kinases-Coupled Receptors

Topic 6. Signal transduction by receptor couplings to tyrosine kinases and protein phosphatases

Topic 7. Eukaryotic Gene Translation: The Ultimate Goal of Signal Transduction

Topic 8. Signals that control mRNA translation

Topic 9. Regulation of cell division

Topic 10. Signal Transduction by Proteolysis and Programmed Cell Death

Topic 11.Ion signal transduction

Topic 12. Sensory Signal Processing

Topic 13. Signaling at synapses: neurotransmitters and their receptors

## Activities and Methodology

| Title | Hours | ECTS | Learning Outcomes |
|---|---|---|---|
| Type: Directed | | | |
| Seminars/ case study | 2 | 0.08 | CM25, CM26, KM29, SM28, SM30, CM25 |
| Theory classes | 18 | 0.72 | CM25, CM26, KM29, SM28, SM30, CM25 |

| Type: Autonomous | | | |
|---|---|---|---|
| Seminar preparation | 4 | 0.16 | CM25, CM26, KM29, SM28, SM30, CM25 |
| Study | 39 | 1.56 | CM25, CM26, KM29, SM28, SM30, CM25 |

Methodology

The training activities of the subject are divided into theory classes, practical cases / seminars, delivery of work through the Virtual Campus.

Theory classes

In these classes the content of the syllabus will be developed, with the support of audiovisual material that will be available to the student through the Virtual Campus of the subject.

The material published on the Intranet of the Virtual Campus is exclusively for teaching and support for face-to-face exhibitions. Students accessing it have the right to make them exclusively for personal use. These images can not be reproduced by any other means or publicly disseminated on websites, social networks or digital networks for the exchange of teaching materials.

It is recommended that the student consult the material published on the Virtual Campus and the books and websites that are recommended in the Bibliography section.

Seminars

Six sessions dedicated to seminars related to the content of the theory program are planned.

During the first weeks of the course, the teacher will propose a set of topics that will be developed for groups of 3-4 people. The result of this work will be reflected in a file in pdf format that will be published on the Virtual Campus and an oral presentation during a seminar session, previously programmed. The oral presentation can in no case exceed 25 minutes. These presentations of the seminars will be made on the days scheduled by the coordination

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Delivery of work

Through the Virtual Campus, practical exercises or cases will be proposed that students will have to work and solve in groups of 3-4 people, before a specific date. A total of two deliveries are expected throughout the semester to be sent - in PDF format - through the Virtual Campus archiving tool within the established term.

This teaching activity is designed to complement the teaching of both theory and seminars.

Students are responsible for learning everything that is contained in this teaching guide. In order to achieve this, we recommend that you use your right to consult in person with the teacher anything related to the subject, its contents and the work commissioned, within the schedule that is determined.

To facilitate communication between students and teachers outside class hours, it is essential that students activate and use the institutional email that UAB provides them. The tools that are considered appropriate from the Virtual Campus of the UAB will also be used.

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 |
|---|---|---|---|---|
| Delivery of work using moodle | 5 | 6 | 0.24 | CM25, CM26, KM29, SM28, SM30 |
| Seminars | 15 | 4 | 0.16 | CM25, CM26, KM29, SM28, SM30 |
| theory exam | 80 | 2 | 0.08 | CM25, KM29, SM28, SM30 |

The evaluation of the subject will be individual and continuous and will be subdivided into the following modules: theory exam and practical cases, delivery of exercises through the Virtual Campus and seminars.

Theory Exam

The exam will be held on the day it appears on the Faculty's website. The test will have a part of multiple-choice questions and short/problem questions. In this way, it is intended to make an integrated evaluation of all the concepts seen in face-to-face classes.

Those students who have not passed the value of 3.5 in the theory exam will have to be examined on the day scheduled for the recovery exam, with the last grades being those that will be taken into account for the calculation of the final grade.

The total weight of this section in the final grade is 80%.

Deliveries of exercises through the Virtual Campus

Exercises or practical cases will be proposed periodically that students will have to solve in groups of 4-5 people and deliver through the corresponding tool of the virtual campus before a specific date. Sufficient time will be allowed between the announcement and the deadline for the submission, but the latter date must be strictly respected as the virtual campus automatically rejects any late submission. The grading of these submissions will be by group and weighted for each individual as follows:

The grade obtained by the group in the delivery will be weighted to calculate the individual grade of each member of the group. The weighting factor will be given by the average of the grades given by the other members of the group on the student's participation in the group.

It is planned to propose two installments throughout the semester and the weight of this section in the final grade is 5%.

Seminars

The evaluation of seminars prepared in groups of 4-5 people will count for 15% of the final grade.

The capacity for analysis and synthesis of thestudents in each group will be evaluated, as well as the skills of group work and oral presentation. This evaluation will be carried out taking into account the content of the seminar, the summary, the presentation and oral defense and the answers to the questions. The teacher participates in this evaluation and awards 80% of the grade. The remaining 20% is given by the evaluation made by classmates. Attendance at seminar presentations is compulsory, so unjustified absence will penalize the grade in this section by 50%.

The individual grade will be calculated from the grade of the group multiplied by the weighting factor that will be calculated from the average of the grades awarded by all the members of the group

Overall assessment

Students must participate and be evaluated in all sections of the subject in order to pass it. Apart from the minimum grade of 3.5 that must be obtained in the theory exam, no other minimum grade is required. To

participate in the reassessment, students must have previously been evaluated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the grade of "Not Assessed" when the evaluation activities carried out have a weighting of less than 67% in the final grade.

The subject will be considered approved when the final sum of the sections into which the grade is subdivided reaches a value of 5.0.

Single assessment

Students who take the single assessment must attend the seminar sessions that correspond to them according to the group to which they belong (A or B), in the sessions included in the degree calendar. They must also participate in the preparation in the group of the presentation of the seminar that corresponds to them and in the programmed activities of exercises via virtual campus.

The same recovery system that is used for continuous assessment will be applied.

## Bibliography


Molecular Biology of the Cell, 7th edition

Bruce Alberts , Rebecca Heald , Alexander Johnson , David Morgan , Martin Raff , Keith Roberts , Peter Walter

Norton 2022.

ISBN: 9780815344322978039384852

Lehninger Principles of Biochemistry, 8th edition

David L. Nelson, Michael M. Cox

New York: Macmillan Higher Education; 2021.

ISBN: 9781319228002

Molecular Cell Biology, 9th edition

Harvey Lodish; Arnold Berk; Chris A. Kaiser; Monty Krieger; Anthony Bretscher; Hidde Ploegh; Kelsey C. Martin; Michael Yaffe; Angelika Amon

New York: Macmillan Higher Education; 2021.

ISBN-10: 1-4292-3413-X

Cellular signal processing (second edition)

Friedrich Marks, Ursula Klingmüller, Karin Müller-Decker

Garland Science;2017

ISBN: 978-0-8153-4534-3

Signal Transduction (Third edition)

Ijsbrand M. Kramer

Elsevier Inc. ; 2015

ISBN: 978-0-12-394803-8

Cell signalling, 3rd edition

John Hancock

Oxford University Press; 2010

ISBN-10: 0-1992-3210-5

Biochemistry of Signal Transduction and Regulation, 5th Edition

Gerhard Krauss

Ed. John Wiley and Sons, 2013,

ISBN-10: 3-5273-3366-5

Handbook of Cell Signaling. 2th edition

Ralph A. Bradshaw and Edward A. Dennis

Elsevier. Academic Press, 2009,

ISBN-10: 0123741459

## Software

No specific software is required

## Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

| Name | Group | Language | Semester | Turn |
|---|---|---|---|---|
| (PAUL) Classroom practices | 331 | Catalan | first semester | morning-mixed |
| (PAUL) Classroom practices | 332 | Catalan | first semester | morning-mixed |
| (TE) Theory | 33 | Catalan | first semester | morning-mixed |