**FIȘA DISCIPLINEI**

Cellular signaling

Academic year 2025-2026

## 1. Information regarding the programme

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| 1.1 Higher education institution | Babeș-Bolyai University |
| 1.2 Faculty | Faculty of Biology and Geology |
| 1.3 Department | Department of Molecular Biology and Geology |
| 1.4 Field of study | Biology |
| 1.5 Study cycle | Master |
| 1.6 Study programme / Qualification | Molecular biotechnology/Masters' degree |
| 1.7. Study type | Full-time education |

**2. Information regarding the discipline**

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| 2.1. Name of the discipline | Cellular signaling | | | | | Code of discipline | **BME1303** |
| 2.2. Course coordinator | | | | Șef lucr. dr. Anca-Daniela STOICA | | | |
| 2.3. Seminar coordinator | | | | Șef lucr. dr. Anca-Daniela STOICA | | | |
| 2.4. Year of study | 2 | 2.5. Semester | 1 | 2.6. Type of evaluation | C | 2.7. Type of discipline | DS |

**3. Total estimated time** (hours/semester of didactic activities)

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|---|---|---|---|---|---|
| 3.1. Hours per week | **4** | of which: 3.2 course | **2** | 3.3. seminar/laboratory/project | **2** |
| 3.4. Total hours in the curriculum | 56 | of which: 3.5. course | 28 | 3.6 seminar/laboratory | **28** |
| Time allotment for **individual study (IS) and autoinstructive activities (AA)** | | | | | **hours** |
| 3.5.1. Learning using manual, course support, bibliography, course notes | | | | | 73 |
| 3.5.2. Additional documentation (in libraries, on electronic platforms, field documentation) | | | | | 10 |
| 3.5.3. Preparation for seminars/labs, homework, papers, portfolios and essays | | | | | 10 |
| 3.5.4. Tutorship | | | | | 3 |
| 3.5.5. Evaluations | | | | | 2 |
| 3.5.6. Other activities: ..... | | | | | |
| 3.7. Total individual study hours (IS) and autoinstructive activities (AA) | | | | **98** | |
| 3.8. Total hours per semester | | | | **154** | |
| 3.9. Number of ECTS credits | | | | **6** | |

**4. Prerequisites** (if necessary)

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| 4.1. curriculum | Biochemistry, Cellular and Molecular Biology |
| 4.2. competencies | • The ability to select, read, understand and process scientific information;<br>• The ability to use scientific information in a given context;<br>• Experimental design. |

**5. Conditions** (if necessary)

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| 5.1. for the course | • Multimedia support (Microsoft Teams) |
| 5.2. for the seminar /lab activities | • Attending at least 80% of the seminars, defending and submitting the paper are conditions for attending the final exam. |

**6.1. Specific competencies acquired**

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| **Professional competencies** | • To identify the role of cell signaling in regulation of body functions;<br>• Understanding the universality, specificity and complexity of cellular signaling processes;<br>• The ability to design an experiment based on investigation methods in the field of cellular signaling; |
| **Transversal competencies** | • Developing the ability to use information regarding the signaling pathways studied for understanding cellular differentiation, development and coordination of the organism;<br>• Using already known data in new contexts;<br>• The use of theoretical data in solving practical problems. |

**7. Objectives of the discipline** (outcome of the acquired competencies)

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| **7.1** General objective of the discipline | Understanding the principles of intra- and intercellular signaling, as well as the cellular/tissue specificity of these mechanisms. |
| **7.2** Specific objective of the discipline | - To identify the intra- and intercellular communication mechanisms and the integration of acquired data into basic concepts;<br>- To explain, using the interactions between signal molecules and membrane receptors, the triggering of specific cellular processes;<br>- To describe the methods of regulation and coordination of cellular functions, as well as the functional particularities of different cell types; |

**8. Content**

| 8.1 Course | Teaching methods | Remarks |
|---|---|---|
| ***1. Cell signaling – introduction.*** Inter- and intracellular communication modalities. Communication through specific membrane areas. Protein domains and modules. | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **2. Cellular signaling pathways.** Phenomena of convergence, divergence, upstream and downstream signaling. | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **3. Detection of extracellular signals. Role of receptors. Types of receptors.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **4-5. Receptors – density, sensitivity and recovery. Their degradation and post-receptor regulation.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |

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|---|---|---|
| **6-7. Phosphorylation and dephosphorylation of proteins. Kinases and phosphatases. Classification and mechanisms.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **8. Phospholipases. Classification, physiological role and signaling pathways.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **9-10. Calcium signaling. Signals, multimodal complexes of calcium signaling.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **11-12. Cell signaling through adhesion molecules. Extracellular matrix. Superfamilies of adhesion molecules.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |
| **13-14. Wnt/Frizzled signaling. Aspects of the involvement of Wnt signaling in development.** | frontal lecture, problematization, learning by discovery, heuristic conversation, critical thinking | |

References


1. Hancock, J.T., 2005: Cell Signalling, 2nd ed., Oxford University Press.
2. Gomperts, B.D., 2003, Signal transduction, Elsevier Academic Press.
3. Beckerman, M., 2005, Molecular and Cellular Signaling, Springer.
4. Stoica, A., 2022, Cellular signalig – course notes.


| 8.2 Seminar | Teaching methods | Remarks |
|---|---|---|
| *1. Students write essays on a topic of their choice, which they present to their peers. Each presentation is followed by discussions involving all students in the group. The essay is presented in the form of a .ppt presentation, and the essay is handed in to the teacher.* | Presentation of the paper; discussions; Presentation of activities and debates | |
| *2-7. Essay presentations.* | Presentation of the paper; discussions; Presentation of activities and debates | |

References


1. Beauchamp, Tom L., James F. Childress, *Principles of Biomedical Ethics*, Fourth Edition, (New York: Oxford University Press, 1994).
2. Lipson, C., Day, M., 2005: *Technical communication and the World Wide Web*, Lawrence Erlbaum Associates, New Jersey
3. Matthews, J.R., MatthweS, R.W., 2008: *Successful scientific writing*, 3rd ed., Cambridge University Press, New York
4. Smith, R.V., 1998: Graduate Research – *A guide for students in the sciences*, University of Washington Press, Washington

**9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program**

- The course has a content similar to the courses from other Romanian and foreign universities, with information constantly updated and adapted to different levels of training.
  The course is structured so that the teaching methods require the activity of the students in the course encouraging the individual study, form psycho-cognitive skills to practical skills.

**10. Evaluation**

| Type of activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Share in the grade (%) |
|---|---|---|---|
| 10.4 Course | Understanding the theoretical contents<br>Ability to use information in a new context | Written exam | 70% |
| 10.5 Seminar/lab activities | Preparation and presentation of a paper | Evaluation of the written report and its presentation | 30% |
| 10.6 Minimum performance standards | | | |
| • Understanding of 50% of the information contained in the course<br>• Preparation of an original paper | | | |

**11. Etichete ODD (Obiective de Dezvoltare Durabilă / Sustainable Development Goals)**

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| | Eticheta generală pentru Dezvoltare durabilă | | | | | | | |
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Date
07.12.2024

Signature of course coordinator

Șef lucr. Dr. Anca Daniela Stoica

Signature of seminar coordinator

Șef lucr. Dr. Anca Daniela Stoica

Date of approval
09.12.2024

Signature of the head of department

Conf. Dr. Beatrice Kelemen