

COURSE SYLLABUS

OXIDATIVE STRESS IN BIOLOGICAL AND BIOMEDICAL RESEARCH

1. Data about the program

| | |
|-----------------------------------|--------------------------------------|
| 1.1 Higher education institution | Babeş-Bolyai University |
| 1.2 Faculty | Faculty of Biology and Geology |
| 1.3 Doctoral school | Integrative Biology |
| 1.4 Field of study | Biology |
| 1.5 Study cycle | Doctorate |
| 1.6 Study program / Qualification | Doctoral training / Ph.D. in Biology |

2. Course data

| | | | | | | | | |
|--------------------------------------|---|--|------------------------------|-------------------------|---|----------------------|---|--|
| 2.1 Name of discipline | | Oxidative stress in biological and biomedical research (BRD1110) | | | | | | |
| 2.2 Teacher responsible for lectures | | | Professor dr. Manuela Banciu | | | | | |
| 2.3 Teacher responsible for seminars | | | Professor dr. Manuela Banciu | | | | | |
| 2.4 Year of study | 1 | 2.5 Semester | 2 | 2.6. Type of evaluation | E | 2.7 Course framework | O | |

3. Estimated total time of teaching activities (hours per semester)

| | | | | | |
|---|-----|----------------------------|----|-----------------------------------|-------|
| 3.1 Hours per week | 4 | Out of which: 3.2 Lectures | 2 | 3.3 Seminars / Laboratory classes | 2 |
| 3.4 Total hours in the curriculum | 48 | Out of which: 3.5 Lectures | 24 | 3.6 Seminars / Laboratory classes | 24 |
| Allocation of study time: | | | | | Hours |
| Study supported by textbooks, other course materials, recommended bibliography and personal student notes | | | | | 64 |
| Additional learning activities in the library, on specialized online platforms and in the field | | | | | 64 |
| Preparation of seminars / laboratory classes, topics, papers, portfolios and essays | | | | | 38 |
| Tutoring | | | | | 34 |
| Examinations | | | | | 2 |
| Other activities: - | | | | | |
| 3.7 Individual study (total hours) | 204 | | | | |
| 3.8 Total hours per semester | 252 | | | | |
| 3.9 Number of credits | 10 | | | | |

4. Preconditions (where applicable)

| | |
|-----------------|--|
| 4.1 Curriculum | Biochemistry, Cell and Molecular Biology, Genetics |
| 4.2 Competences | <ul style="list-style-type: none"> • Skills in using laboratory equipment · • Interpretation of biochemical data |

5. Conditions (where applicable)

| | |
|--|---|
| 5.1 Conducting lectures | <ul style="list-style-type: none"> • Online communication/ meeting platform (MS Teams,) • Audio-video logistics, whiteboard · |
| 5.2 Conducting seminars / laboratory classes | <ul style="list-style-type: none"> • Admission at final evaluation is conditioned by at least 80% attendances at the scheduled laboratory classes. |

6. Specific competences acquired

| | |
|---------------------------------|--|
| Professional competences | <ul style="list-style-type: none"> • Acquiring the conceptual and analytical capacity to approach the molecular study of the induction of oxidative stress. • Developing the capacities of Ph.D. students to organize and carry out practical activities as future researchers in laboratories of biotechnology, biochemistry, cellular and molecular biology, molecular ecology. • Development of skills for writing and interpreting scientific papers with a modern biological subject |
| Transversal competences | <ul style="list-style-type: none"> • Acquiring advanced biological knowledge necessary for an interdisciplinary STEM approach to the topic of the doctoral research; • Use of theoretical notions in solving practical problems. |

7. Course objectives (based on the acquired competencies grid)

| | |
|---|---|
| 7.1 The general objective of the course | <ul style="list-style-type: none"> • Acquiring theoretical and practical information on the mechanism of induction of cellular oxidative stress |
| 7.2 Specific objectives | <ul style="list-style-type: none"> • Development of the PhD students capacity to explore the molecular mechanisms underlying the reactivity of living organisms to different physiological and pathological conditions as well as various environmental conditions. • Learning the methodological principles underlying molecular techniques for investigating cellular oxidative stress. |

8. Content

| 8.1 Lectures | Teaching methods | Comments |
|--|---|----------|
| 1-2. Energy metabolism-metabolic pathways involved in induction of cellular oxidative stress | Debate, interactive presentation, problem-based learning. | 4 hours |
| 3-4. Cell signalling pathways involved in oxidative stress | | 4 hours |
| 5-7. Tumor cell metabolism reprogramming | | 6 hours |
| 8-9. Involvement of oxidative stress in aging and degenerative diseases | | 4 hours |
| 10-12. Adaptive responses of different organisms to oxidative stress induced by environmental factors (bioindicators to environmental pollution, adaptation mechanisms). | | 6 hours |
| Bibliography: Scientific articles from public databases (PubMed Central, SpringerLink ,etc.) accessed via „LUCIAN BLAGA” Central University Library of Cluj-Napoca, Anelis | | |
| 8.2 Seminars / laboratory classes | Teaching methods | Comments |
| 1. Laboratory organization and labor protection instructions. | Presentation, discussion (online using MS teams platform) | 2 hours |
| 2. Determination of oxidative stress markers using biochemical (HPLC, spectrophotometry), immunochemical | Practical work-onsite Problem-solving and discussion | 20 hours |

| | | |
|--|---|---------|
| (western blotting, immunohistochemistry) and molecular biology (qRT-PCR) methods. | | |
| 3. Examination - Presentation of a project based on critical thinking, with a topic related to the involvement of cellular oxidative stress in the research topic of a doctoral thesis | Discussion on a specific topic related to the research topic of a doctoral thesis | 2 hours |
| Bibliography: Scientific articles from public databases (PubMed Central, SpringerLink ,etc.) accessed via „LUCIAN BLAGA” Central University Library of Cluj-Napoca, Anelis | | |

9. Aligning the contents of the discipline with the expectations of the epistemic community representatives, professional associations and standard employers operating in the program field

| |
|---|
| <ul style="list-style-type: none"> The course has a similar content to courses from other European universities and observe the level of training of doctoral students The course is essential for the development of working skills in applied research laboratories in biological and medical fields. |
|---|

10. Examination

| 10. Examination | | | |
|---|--------------------------|-------------------------|--------------------------------|
| Activity type | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Weight in the final grade |
| 10.4 Lectures | Assessment of knowledge | Oral exam | 50% |
| 10.5 Seminars / laboratory classes | Activity during seminars | Oral exam | 50% |
| | Assessment of knowledge | | |
| 10.6 Minimum performance standard | | | |
| Knowledge of 50% of the information content of the course | | | |
| Knowledge of 50% of the information content of the laboratory work. | | | |

Date of issue

10.09.2022

Signature of the teacher
responsible for lectures

Prof. dr. Manuela Banciu

Signature of the teacher
responsible for seminars

Prof. dr. Manuela Banciu

Date of approval by the doctoral school council

15.09.2022

Signature of the Doctoral School Director

Prof. Univ. Dr. PAP Péter-László