

**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"> <li>• Skills in using laboratory equipment ·</li> <li>• Interpretation of biochemical data</li> </ul>

**5. Conditions (where applicable)**

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

**6. Specific competences acquired**

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Acquiring the conceptual and analytical capacity to approach the molecular study of the induction of oxidative stress.</li> <li>• 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.</li> <li>• Development of skills for writing and interpreting scientific papers with a modern biological subject</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Acquiring advanced biological knowledge necessary for an interdisciplinary STEM approach to the topic of the doctoral research;</li> <li>• Use of theoretical notions in solving practical problems.</li> </ul>

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

7.1 The general objective of the course	<ul style="list-style-type: none"> <li>• Acquiring theoretical and practical information on the mechanism of induction of cellular oxidative stress</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Learning the methodological principles underlying molecular techniques for investigating cellular oxidative stress.</li> </ul>

### 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"> <li>The course has a similar content to courses from other European universities and observe the level of training of doctoral students</li> <li>The course is essential for the development of working skills in applied research laboratories in biological and medical fields.</li> </ul>
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**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

13.06.2023

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

14.06.2023

Signature of the Doctoral School Director

Prof. Univ. Dr. PAP Péter-Laszló