**Course sheet**

**1. Data about the program**

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| 1.1 Higher education institution | Babeș-Bolyai University |
| 1.2 Faculty | Faculty of Chemistry and Chemical Engineering |
| 1.3 Doctoral school | Chemistry |
| 1.4 Field of study |  |
| 1.5 Study cycle | Doctorate |
| 1.6 Study program / Qualification | Doctoral training / Doctor of Chemistry |

**2. Course data**

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| 2.1 Name of discipline | | | **Biocatalysis- a Tool for a Sustainable Development** SDC-19-09 | | | | | | |
| 2.2 Teacher responsible for lectures | | | | | Prof. habil. dr. eng. Monica Ioana TOȘA | | | | |
| 2.3 Teacher responsible for seminars | | | | | Prof. habil. dr. eng. Monica Ioana TOȘA | | | | |
| 2.4 Year of study | 1st | 2.5 Semester | | 2 | | 2.6. Type of evaluation | E | 2.7 Course framework | Opt |

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

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 3.1 Hours per week | 2 | | Out of which: 3.2 Lectures | | 1 | 3.3 Seminars / Laboratory classes | 1 |
| 3.4 Total hours in the curriculum | 24 | | Out of which: 3.5 Lectures | | 12 | 3.6 Seminars / Laboratory classes | 12 |
| Allocation of study time: | | | | | | |  |
| Study supported by textbooks, other course materials, recommended bibliography and personal student notes | | | | | | | 8 |
| Additional learning activities in the library, on specialized online platforms and in the field | | | | | | | 6 |
| Preparation of seminars / laboratory classes, topics, papers, portfolios and essays | | | | | | | 8 |
| Tutoring | | | | | | | - |
| Examinations | | | | | | | 2 |
| Other activities: - | | | | | | |  |
| 3.7 Individual study (total hours) | | 24 | |
| 3.8 Total hours per semester | | 24 | |
| 3.9 Number of credits | | 10 | |

**4. Preconditions** (where applicable)

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| 4.1 Curriculum | * None |
| 4.2 Competences | * None |

**5. Conditions** (where applicable)

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| 5.1 Conducting lectures | * Mobile phones should be shut down * No delays are accepted |
| 5.2 Conducting seminars / laboratory classes | * Mobile phones should be shut down * The scientific reports should be ready one week before their oral presentation |

**6. Specific competences acquired**

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| **Professional competences** | * C1.1 Definition of notions, concepts, theories of applied biochemistry and biocatalysis and their use in professional communication * C1.2 Use of basic knowledge of fundamental sciences to interpret and explain the bioprocesses * C1.3 Critical analysis and use of principles, methods and working techniques for quantitative and qualitative evaluation of bioprocesses * C1.4 Theoretical approach of specific issues by using established principles and methods of biochemistry and bioprocesses |
| **Transversal competences** | * Accomplishment of requested tasks with respect of imposed conditions and deadlines, of professional and moral rules and by following an established working plan * Solving of requested tasks in agreement with the general objectives and through integration in a working group * Information and permanent documentation in the field of interest * Improvement of professional results by involvement in the conducted activities |

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

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| 7.1 The general objective of the course | * Getting familiar of PhD students with the most important applications of Biocatalysis as essential tool in a sustainable economy |
| 7.2 Specific objectives | * Acquisition of theoretical knowledge and practical skills related to the use of biocatalytic approaches in various industrial fields * Understanding of the interdisciplinary and applicative character of biocatalysis in a modern sustainable economy * Gaining experimental skills in the field of bioprocesses and enzymatic approaches for environment protection |

**8. Content**

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| **8.1 Lectures** | **Teaching methods** | **Comments** |
| 8.1.1-2. Principles of circular economy. Renewable natural resources. Biocatalysis as modern tool for sustainable green applications | Presentation, discussion, case studies |  |
| 8.1.3-4. Biocatalysis: from enzyme catalysis theory to (multi)enzymatic processes development and of green and sustainable industrial applications |
| 8.1.5-6. Industrial applications of hydrolyses. Biomass bioconversion in valuable products. |
| 8.1.7-8. Waste valorization through enzymatic bioprocesses.s |
| 8.1.9-10. Lignocellulosic biomass valorization. |
| 8.1.11-12. Case studies | Presentation, discussion, case studies, critical analysis |
| **8.2 Seminars / laboratory classes** | **Teaching methods** | **Comments** |
| 8.2.1. General discussion. Experimental activity schedule  8.2.2. Bioprocess evaluation methods  8.2.3. Bioprocess optimization  8.2.4. Biocatalyst preparation, isolation and purification  8.2.5. Industrial enzyme preparates. Immobilization techniques.  8.2.6. Bioprocess economical evaluation  8.2.7. Individual final evaluation | Presentation, discussion, exercises | Individual case study of each PhD-student based on individual doctoral research topics, experimental activity |
| **Bibliography:**  John Whittall, Peter Sutton: *Biocatalysis and Biotransformations*, 2010 John Wiley & Sons Ltd  2. Andr´es Illanes: *Enzyme Biocatalysis: Principles and Applications*, 2008 Springer Science Business Media B.V.  3. Pabulo H. Rampelotto: *Enzymes and Their Biotechnological Applications*, 2015, MDPI • Basel • Beijing • Wuhan  4. Peter Grunwald: Immobilized Biocatalysts, 2018, MDPI *•* Basel *•* Beijing *•* Wuhan *•* Barcelona *•* Belgrade.  5. Scientific journals | | |

**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**

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| * By getting familiar with the theoretical and experimental concepts of Biocatalysis, the doctoral students get important knowledge in agreement with the partial competences required for the possible occupations mentioned in Grille 1-RNCIS |

**10. Examination**

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| Activity type | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Weight in the final grade |
| 10.4 Lectures | Assessment of knowledge | Oral presentations | 70% |
| 10.5 Seminars / laboratory classes | Activity during seminars | Discussions, answers to questions | 30% |
| 10.6 Minimum performance standard | | | |
| * Satisfactory | | | |

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| Date of issue | Signature of the teacher responsible for lectures | Signature of the teacher responsible for seminars |

25.04.2023

 

Date of approval by the doctoral school council Signature of the doctoral school director

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