**COURSE SYLLABUS**

**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 | Chemistry |
| 1.5 Study cycle | Doctorate |
| 1.6 Study program / Qualification | Doctoral training / PhD in Chemistry |

**2. Course data**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 2.1 Name of discipline | | | Research ethics and methodology, intellectual property rights | | | | |
| 2.2 Teacher responsible for lectures | | | Acad. Prof. dr. Cristian SILVESTRU | | | | |
| 2.3 Teacher responsible for seminars | | | Acad. Prof. dr. Cristian SILVESTRU | | | | |
| 2.4 Year of study | I | 2.5 Semester | II | 2.6. Type of evaluation | Ea | 2.7 Course framework | Obb |

a the PhD student can choose to participate in activities without an exam or with an exam. b Ob = mandatory discipline.

**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 | 1 |
| 3.4 Total hours in the curriculum | 24 | Out of which: 3.5 Lectures | | | 12 | 3.6 Seminars | 12 |
| Allocation of study time: | | | | | | | hrs |
| Study supported by textbooks, other course materials, recommended bibliography and personal  student notes | | | | | | | 30 |
| Additional learning activities in the library, on specialized online platforms and in the field | | | | | | | 70 |
| Preparation of seminars / laboratory classes, topics, papers, portfolios and essays | | | | | | | 118 |
| Tutoring | | | | | | | 8 |
| Examinations | | | | | | | - |
| Other activities: - | | | | | | | - |
| 3.7 Individual study (total hours) | | | 226 |  | | | |
| 3.8 Total hours per semester | | | 250 |
| 3.9 Number of credits | | | 10 |

**4. Preconditions** (where applicable)

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| --- | --- |
| 4.1 Curriculum | • It's not necessary |
| 4.2 Competences | • It's not necessary |

**5. Conditions** (where applicable)

5.1 Conducting lectures • The courses and seminars take place in conditions of access to internet and

databases

• Students will have access to databases (subscribed by faculty / university,

central library)

• Interactive participation will be stimulated

• Students will attend the class with their mobile phones closed

5.2 Conducting seminars / laboratory classes

• Students will attend the class with their mobile phones closed

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**6. Specific competences acquired**

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|  | • Carrying out an extensive bibliographic study related to the chosen research topic, organizing and  synthesizing data with the learning of field-specific terminology; knowledge of general and specific  research methods;  • The use of expertise to establish research strategy, conduct experiments and interpret results;  • The use of the conceptual and methodological research apparatus for new theoretical approaches in  chemical synthesis and depollution technologies;  • Selection and appropriate use of research methods for a correct interpretation of results and formulation  of relevant conclusions;  • The use of fundamental and applied concepts in the development of research projects. |
|  | • Execution of complex professional tasks, respecting the norms of professional ethics and moral  conduct, following its own work plan and proposing innovative solutions to specific problems;  • Planning, monitoring and assuming the professional tasks of a subordinate professional group (s).  Demonstration of the ability to coordinate the activity, analytical thinking, adaptability and flexibility, collaboration with team members. |

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

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| --- | --- |
| 7.1 The general objective of the course | The objectives of the course are:  • familiarization with general notions about the methodology of scientific  research;  • presentation of ethics and correct conduct in academia and research;  • information on scientific documentation;  • writing a research project, a doctoral thesis, respectively a scientific paper;  • ethical norms in writing a research project, a doctoral thesis, respectively a  scientific paper. |
| 7.2 Specific objectives | • Research as a human activity. The scientific method. Fundamental research  and applied research. Borderline research;  • Researcher's motivation and qualities. Research environment. Ethics and good  conduct in research;  • Scientific publications and documentation. Reading the scientific paper.  Writing the scientific paper;  • Scientific research in Romania;  • International cooperation in the field of research;  • Ethical aspects in taking over and communicating original or published  scientific data. |

**8. Content**

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| --- | --- | --- |
| 8.1 Lectures | Teaching methods | Comments |
| 8.1.1. Research as a human activity. Scientific methodology. Fundamental research and applied research. Borderline research. The risk of trivial research. | Lecture; explication; conversation; description | 1 hour |
| 8.1.2. Research environment: why, who, what, where, when to do a research? The motivation and quality of the researcher. The mentor- disciple relationship in vocational training. | Lecture; explication; conversation; description | 1 hour |
| 8.1.3. Ethics and academic integrity. Concepts, definitions, pro and  contra examples. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.4. Ethics and good conduct in research. Deviations from ethics: data  manufacturing; data falsification; plagiarism. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.5. Ethics and good conduct in research. Publication of results: quality of author / co-author; conflict of interest; codes of ethics of universities, societies and scientific publications. | Lecture; explication; conversation; description | 1 hour |

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| 8.1.6. Scientific publications and documentation: (a) Types of  publications; (b) Ranking of scientific publications. Impact factor. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.7. Scientific publications and documentation: (a) Types of scientific  papers; (b) Databases; Electronic sources of information; Internet. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.8. Scientific publications and documentation. Taking over the  literature data. Reading the scientific paper. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.9. Writing scientific papers. Presentation of the scientific paper  (seminar, conference, congress). | Lecture; explication;  conversation; description | 1 hour |
| 8.1.10. Intellectual property rights. Patent. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.11. Scientific research and society. Academic and professional  responsibility. | Lecture; explication;  conversation; description | 1 hour |
| 8.1.12. Scientific research in Romania: (a) Legislation, organization, funding; (b) The main “actors” in scientific research in Romania (institutions) and the “geography” of research (territorial distribution); (c) The international visibility of research in Romania; (d) The European context. Institutions, programs. | Lecture; explication; conversation; description | 1 hour |
| **Bibliography**  1. H. Selye, *De la vis la descoperire*, Editura Medicala, Bucuresti, 1968.  2. M. S. Rădulescu, *Metodologia cercetării științifice,* Ed. Didactică şi Pedagogică, Bucureşti, 2006.  3. C. Enăchescu, *Tratat de teoria cercetării științifice,* Editura Polirom, Bucureşti, 2005.  4. Mehlich, F. Moser, B. van Tiggelen, L. Campanella, H. Hopf, *The Ethical and Social Dimensions of Chemistry:*  *Reflections, Considerations, and Clarifications*, *Chem. Eur. J.* **2017**, *23*, 1210 – 1218.  5. R. E. Spier, *Science and Engineering Ethics*, Overview in *Encyclopedia of Applied Ethics*, (Ed.: R. Chadwick),  2nd edition, Elsevier, London, **2012**.  6. Research ethics, in , http://www.en.wikipedia.org/wiki/research\_ro  7. Research methodology, in www.en.wikipedia.org/wiki/research\_methodology  8. Asociaţia Ad astra – “*Evaluarea cercetării ştiinţifice”* , revista Ad Astra, nr. 4/2005.  9. Legea nr. 206/2004 privind buna conduită în cercetarea științifică, dezvoltarea tehnologică şi inovare.  **Optional bibliography**  1. Ionel Haiduc: Cercetarea științifică din România în context internațional. Evoluții recente. Colaborări  internaționale, *Academica*, Anul XII, Nr. 2-3, Mai-iunie 2002, p. 56-59.  2. Ionel Haiduc: Aspecte etice ale cercetării științifice în chimie, biologie şi medicină, *Revista de Politica Științei și Scientometrie* 2005, 3(1) 37-42.  3. H. Frank, L. Campanella, F. Dondi, J. Mehlich, E. Leitner, G. Rossi, K. N. Ioset, G. Bringmann, *Ethics,*  *Chemistry, and Education for Sustainability*, *Angew. Chem. Int. Ed.* **2011**, *50*, 8482 – 8490.  4. R. R. Ernst, *The Responsibility of Scientists, a European View*, *Angew. Chem. Int. Ed.* **2003**, *42*, 4434 –4439. | | |
| 8.2 Seminars / laboratory classes | Teaching methods | Comments |
| 8.2.1. Use of databases and primary scientific literature. | Explication; Conversation;  Description | 1 hour |
| 8.2.2. Documentation from databases and scientific publication data  from published articles. | Explication; Conversation;  Description | 1 hour |
| 8.2.3. Systematization and processing of bibliographic data in the elaboration of a scientific project / article. Presentation of bibliographic references. | Explication; Conversation; Description | 1 hour |
| 8.2.4. Ethical aspects in writing a research project. | Explication; Conversation;  Description | 1 hour |
| 8.2.5-6. Writing a research project. | Explication; Conversation;  Description | 4 hours |
| 8.2.7. Ethical aspects in the evaluation of a research project. | Explication; Conversation;  Description | 1 hour |
| 8.2.8. Identifying ethical issues in writing a scientific article. Case  Study. | Explication; Conversation;  Description | 1 hour |
| 8.2.9-10. Writing a scientific article. | Explication; Conversation;  Description | 4 hours |

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8.2.11-12. Presentation of the research project / written article.

Explication; Conversation; Description

4 hours

**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**

• By mastering the theoretical-methodological concepts and addressing the practical aspects included in

the discipline ***Ethics and research methodology, intellectual property rights***, students acquire a consistent knowledge, applicable in virtually any field and in accordance with the partial competencies required for possible occupations provided in the Grid 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 | Correctness of answers - proper acquisition and understanding of the issues addressed | Oral examination | 60% |
| The way of thinking, the correctness, and the argumentation of the proposed solutions |
| 10.5 Seminars / laboratory classes | Activity during seminars | Presentation of research articles / projects | 40% |
| 10.6 Minimum performance standard | | | |
| • exam grade 5 (five) | | | |

Date of issue

Signature of the teacher

responsible for lectures

Signature of the teacher

responsible for seminars

October 1st, 2021

Date of approval by the doctoral school council

Signature of the doctoral school director

Prof. Dr. Ion Grosu

Corresponding Member of Romanian Academy

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