COURSE DESCRIPTION

Ethic and Research Methodology and intellectual Property

Academic year 2025-2026

1. Programme-related data

1.1. Higher Education Institution	Babeș-Bolyai University
1.2. Faculty	Faculty of Chemistry and Chemical Engineering
1.3. Department	Doctoral School of Chemistry
1.4. Field	Chemistry
1.5. Level of study	PhD degree
1.6. Degree programme / Qualification	PhD degree / PhD in Chemistry
1.7. Form of education	With frequency

2. Course-related data

2.1. Course title	Ethic and Research Methodology and Intellectual Property			Course code	**SDC-19-07**
2.2. Course coordinator	Acad. Prof. dr. Cristian SILVESTRU				
2.3. Seminar coordinator	Acad. Prof. dr. Cristian SILVESTRU				
2.4. Year of study	I	2.5. Semester	2	2.6. Type of assessment	Exam
2.7. Course status	Compulsory	2.8. Tipul disciplinei		Complementary subject	

3. Total estimated time (hours per semester of teaching activities)

3.1. Number of hours per week	3	of which: 3.2. course	2	3.3. seminar/ laboratory/ project	1
3.4. Total of hours in the curriculum	36	of which: 3.5. course	24	3.6 seminar/ laboratory	12
Time allocation for individual study (IS) and self-taught activities (ST)					**hours**
Learning from textbooks, course materials, bibliography, and notes (IS)					100
Additional research in the library, on subject-specific electronic platforms, and on-site					50
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					40
Tutoring (professional guidance)					8
Examinations					6
Other activities [i.e.: two-way communication with the course coordinator]					10
3.7. Total hours of individual study (IS) and self-taught activities (ST)				**214**	
3.8. Total hours per semester				**250**	
3.9. Number of credits				**10**	

4. Prerequisites (where applicable)

4.1. curriculum-related	Not applicable
4.2 skills-related	Not applicable

5. Specific conditions (where applicable)

5.1. course-related	• Courses are held with access to the internet and databases • Students will have access to databases (subscribed databases by the faculty/university, central library) • Interactive participation will be encouraged • Students will come to class with their mobile phones turned off
5.2. seminar/laboratory-related	• Seminars are held with access to the internet and databases • Students will come to the seminar with their mobile phones turned off

6.1. Competencies resulting from the completion of the degree programme[1]

Professional competencies	
Competency code	**Competency**
PC1	Advanced expertise in chemistry and doctoral-level research topics
PC4	Planning, designing, and implementing an original scientific research project, in compliance with academic ethics and integrity
PC5	Applying and developing advanced research and analytical methods; critically interpreting data and formulating innovative solutions
Transversal competencies	
Competency code	**Competency**
TC2	Advanced scientific communication in Romanian and English; collaboration in interdisciplinary and multicultural settings
TC3	Advanced digital skills for research, data analysis, and dissemination; responsible use of digital tools.

6.2. Learning outcomes relevant to the degree programme (as referred to in the curriculum)[2]

Learning outcomes targeted by the subject		
Competency code	**Knowledge and comprehension**	**Specific academic skills**
PC1	Advanced and up-to-date knowledge in chemistry and the research field; critical understanding of the scientific literature.	Applies and synthesizes advanced concepts/theories to formulate research hypotheses; justifies the choice of scientific approaches.
PC4	Advanced research methodologies: experimental design, modern synthesis and characterization techniques, analysis and validation; principles of research project management.	Designs, plans and implements a research project; applies quality and safety procedures and documents stages and data with full traceability.
PC5	Advanced strategies for data analysis, interpretation, and integration; evaluation of methodological limitations, reproducibility, and scientific impact.	Critically analyses complex data, estimates uncertainty and formulates conclusions; proposes methodological improvements and directions for research/innovation.
TC2	Scientific terminology and communication in Romanian and English; the structure of scientific articles and presentations; good citation practices.	Writes and presents scientific results in Romanian/English coherently; provides well-argued responses to comments and peer reviews.
TC3	Digital tools for research, citation, and data processing (databases, specialized software, reference managers); responsible use of digital resources.	Uses discipline-specific digital tools effectively; manages citations; uses digital resources responsibly in research activities.

7. Subject-specific learning outcomes

Knowledge and understanding
1. Familiarization with general notions about scientific research methodology. Conducting an extensive bibliographic study related to the chosen research topic, organizing and synthesizing data with the acquisition of domain-specific terminology; knowledge of general and specific research methods.

[1] The professional and/or transversal skills targeted by the subject for which the course description is prepared will be copied from the curriculum of the degree programme. For each competency, the complete entry, including the competency code, will be copied with the exact wording that appears in the curriculum, without any changes. If no competency is copied from either of the two categories, the row corresponding to that category is deleted from the table.

[2] The learning outcomes relevant for the degree programme and targeted by the subject for which the course description is prepared will be listed. The entries, copied without any changes from the Curriculum by subject type (Core Subject/Specialisation Subject/Complementary Subject), are listed under the corresponding competency.

2.	Using specialized knowledge to establish research strategy, conduct experiments and interpret results.
3.	Using the conceptual and methodological research apparatus for new theoretical approaches.
4.	Selection and appropriate use of research methods for a correct interpretation of results and formulation of pertinent conclusions; international cooperation in the field of research.
5.	Use of fundamental and applied concepts in the development of research projects; use of intellectual property rights.
6.	Ethical aspects in the acquisition and communication of original or published scientific data. Ethics and correct conduct in research.
	Specific academic skills
1.	Performing complex professional tasks, respecting the norms of professional ethics and moral conduct, following an own work plan and proposing innovative solutions to specific problems that arise.
2.	Planning, monitoring and assuming the professional tasks of a professional group(s).
3.	Ability to coordinate activity, analytical thinking, adaptability and flexibility, collaboration with team members.
4.	Respecting ethical norms in writing a research project, doctoral thesis, or scientific paper.
5.	Ability to prepare written papers and publicly defend these papers.

8. Contents

8.1 Course	**Teaching and learning methods**	**Remarks** [3]
8.1.1. Research as a human activity. The scientific method. Fundamental and applied research. Frontier research. The risk of trivial research.	Lecture, explanation, conversation, description.	2 hours/week
8.1.2. The research environment: why, who, what, where, when it is carried out. The motivation and quality of the researcher. The mentor-disciple relationship in professional training.	Lecture, explanation, conversation, description.	2 hours/week
8.1.3. Ethics and academic integrity. Concepts, definitions, examples, pros and cons.	Lecture, explanation, conversation, description.	2 hours/week
8.1.4. Ethics and proper conduct in research. Ethical violations: data fabrication, data falsification, plagiarism.	Lecture, explanation, conversation, description.	2 hours/week
8.1.5. Ethics and proper conduct in research. Publication of results: authorship/co-authorship; conflict of interest; ethical codes of universities, societies and scientific publications.	Lecture, explanation, conversation, description.	2 hours/week
8.1.6. Scientific publications and documentation: (a) Types of publications; (b) Ranking of scientific publications. Scientometric parameters.	Lecture, explanation, conversation, description.	2 hours/week
8.1.7. Scientific publications and documentation: (a) Types of scientific papers; (b) Databases; Electronic sources of information; Internet.	Lecture, explanation, conversation, description.	2 hours/week
8.1.8. Scientific publications and documentation. Retrieving data from literature. Reading scientific papers.	Lecture, explanation, conversation, description.	2 hours/week
8.1.9. Writing scientific papers. Presentation of scientific papers (seminar, lecture/conference, congress).	Lecture, explanation, conversation, description.	2 hours/week
8.1.10. Intellectual property rights. Patents.	Lecture, explanation, conversation, description.	2 hours/week
8.1.11. Scientific research and society. Academic and professional responsibility.	Lecture, explanation, conversation, description.	2 hours/week
8.1.12. Scientific research in Romania: (a) legislation, organization, financing; (b) participants "actors" in scientific research in Romania (institutions) and the "geography" of research (territorial distribution); (c) international visibility	Lecture, explanation, conversation, description.	2 hours/week

[3] For example, organisational aspects, recommendations for students, specific aspects relating to the course/seminar, such as inviting experts in the field, etc.

of research in Romania; (d) European context - institutions, programs.		

Bibliografie

1. H. Selye, *De la vis la descoperire*, Ed. Medicală, București, 1968.
2. M. S. Rădulescu, *Metodologia cercetării științifice*, Ed. Didactică și Pedagogică, București, 2006.
3. C. Enăchescu, *Tratat de teoria cercetării științifice*, Ed. Polirom, București, 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 Ed., 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. *Asociația Ad astra – "Evaluarea cercetării științifice"*, revista *Ad Astra*, nr. 4/**2005**.
9. Legea nr. 206/2004 privind buna conduită în cercetarea științifică, dezvoltarea tehnologică și inovare.

Bibliografie opțională

10. I. Haiduc, *Cercetarea științifică din România în context internațional. Evoluții recente. Colaborări internaționale*, **Academica**, Anul XII, Nr. 2-3, Mai-iunie **2002**, p. 56-59.
11. I. Haiduc, *Aspecte etice ale cercetării științifice în chimie, biologie și medicină*, *Revista de Politica Științei și Scientometrie*, **2005**, *3(1)*, 37–42.
12. 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.
13. R. R. Ernst, *The Responsibility of Scientists, a European View*, *Angew. Chem. Int. Ed.*, **2003**, *42*, 4434–4439.

8.2 Seminar	**Teaching and learning methods**	**Remarks**
8.2.1. Use of databases and primary scientific literature.	Explanation, conversation, description, problematization	1 hour / week
8.2.2. Documentation from databases and scientific publications on a research topic. Retrieval of literature data.	Explanation, conversation, description, problematization	1 hour / week
8.2.3. Systematization and processing of bibliographic data in the development of a scientific project / article. Presentation of bibliographical references.	Explanation, conversation, description, problematization	1 hour / week
8.2.4. Ethical aspects in writing a research project.	Explanation, conversation, description, problematization	1 hour / week
8.2.5-6. Writing a research project.	Explanation, conversation, description, problematization	2 hours / 2 weeks
8.2.7. Ethical aspects in evaluating a research project.	Explanation, conversation, description, problematization	1 hour / week
8.2.8. Identifying ethical issues in writing a scientific article. Case study.	Explanation, conversation, description, problematization	1 hour / week
8.2.9-10. Writing a scientific article.	Explanation, conversation, description, problematization	2 hours / 2 weeks
8.2.11-12. Presentation of the written research project/ article.	Explanation, conversation, description, problematization	2 hours / 2 weeks

Bibliografie

1. *Instructions for autors* pentru redactarea de articole științifice sau alte texte de specialitate (capitole de cârti, proiecte de cercetare, etc.) (bibliografie pusă la dispoziția cursanților de către titularul de curs)
2. *Pachet de informații pentru competiții de proiecte* (bibliografie pusă la dispoziția cursanților de către titularul de curs)

9. Evaluation

Type of activity	**9.1 Evaluation criteria[4]**	**9.2 Evaluation methods[5]**	**9.3 Percentage in the final grade**
9.4 Course	Correctness of answers – correct acquisition and understanding of the issue addressed	Oral exam	60%

[4] The evaluation criteria must directly reflect the learning outcomes targeted at the level of the degree programme respectively at the level of the subject. More specifically, the learning outcomes set out in the expected learning outcomes are assessed.

[5] Both final evaluation methods and ongoing evaluation strategies should be established.

	The way of thinking, the correctness and argumentation of the proposed solutions		
9.5 Seminar	The activity carried out at the seminar	Presentation of articles/research projects	40%
9.6 Minimum standard for passing			
Grade 5 (five)			

10. SDG labels (Sustainable Development Goals)[6]

	○ Sustainable Development Generic Label							
1 FĂRĂ SĂRĂCIE	2 FOAMETE „ZERO”	3 SĂNĂTATE ȘI BUNĂSTARE	4 EDUCAȚIE DE CALITATE	5 EGALITATE DE GEN	6 APĂ CURATĂ ȘI SANITAȚIE	7 ENERGIE CURATĂ ȘI LA PREȚURI ACCESIBILE	8 MUNCĂ DECENTĂ ȘI CREȘTERE ECONOMICĂ	9 INDUSTRIE, INOVAȚIE ȘI INFRASTRUCTURĂ
○	○	○	X	○	○	○	○	○
10 INEGALITĂȚI REDUSE	11 ORAȘE ȘI COMUNITĂȚI DURABILE	12 CONSUM ȘI PRODUCȚIE RESPONSABILE	13 ACȚIUNE CLIMATICĂ	14 VIAȚA ACVATICĂ	15 VIAȚA TERESTRĂ	16 PACE, JUSTIȚIE ȘI INSTITUȚII EFICIENTE	17 PARTENERIATE PENTRU REALIZAREA OBIECTIVELOR	No label applies
○	○	○	○	○	○	○	○	○

Date of entry:

January 30, 2026

Signature of course coordinator

Signature of seminar coordinator

Date of approval in CDSC:

...

Signature of the Director of the DSC

Prof. dr. Niculina Daniela Hădade

[6] Select a single label which, according to the *Implementation of SDG labels in the academic process*, best matches the subject. If the subject addresses sustainable development in a generic manner (i.e. by presenting/introducing the general framework of sustainable development, etc.), then the Sustainable Development generic label may be applied. If none of the labels describe the subject, select the last option: *"No label applies."*