



## COURSE DESCRIPTION

### 1. Programme Identification Data

1.1 Higher Education Institution	„ALEXANDRU IOAN CUZA” UNIVERSITY OF IAȘI
1.2 Faculty	FACULTY OF CHEMISTRY
1.3 Department / Doctoral School	DOCTORAL SCHOOL OF CHEMISTRY
1.4 Field of Study	CHEMISTRY
1.5 Cycle of Studies	DOCTORATE
1.6 Study Programme / Qualification	ADVANCED UNIVERSITY STUDIES – DOCTORAL SCHOOL OF CHEMISTRY / PhD IN CHEMISTRY

### 2. Course Identification Data

2.1 Course Title	EXPERIMENTAL TECHNIQUES, PROCESSING AND INTERPRETATION OF RESEARCH RESULTS – MODULE II						
2.2 Course coordinator (lectures)	[NAME, ACADEMIC TITLE]						
2.3 Seminar coordinator	[NAME, ACADEMIC TITLE] (if applicable)						
2.4 Year of study	I	2.5 Semester	1	2.6 Type of assessment	*C	2.7 Discipline regime	**OC

\*[E – exam / C – colloquium] \*\*[CC = Compulsory Course / OC = Optional Course]

### 3. Estimated Total Workload (hours per semester)

3.1 Hours per week	0.75	3.2 Lectures	0.75	3.3. Seminars	-
3.4 Total hours according to the curriculum	10.5	3.5 Lectures	10.5	3.6. Seminars	-
Time allocation					hours
Study based on textbooks, course materials, bibliographic sources, and other relevant resources					15
Additional research in the library, on specialized electronic platforms, and in the field					20
Preparation for seminars, assignments, papers, portfolios, essays					15
Academic tutoring					4
Assessment activities					4
Other activities					6.5
3.7 Total hours of individual study					64.5
3.8 Total hours per semester					75
3.9 Number of credits					3

### 4. Preconditions (if applicable)

4.1 Curriculum prerequisites	Completion of a Master's degree or an equivalent qualification. Enrollment in the doctoral study program in the field of Chemistry, in accordance with the regulations of the Doctoral School. Completion and successful passing of Module I of the course Experimental Techniques, Processing and Interpretation of Research Results..
4.2 Competences prerequisites	Basic competence in the use of scientific language specific to the field of Chemistry; the ability to analyze and interpret scientific information from specialized literature; competence in documentation, synthesis, and scientific argumentation; as well as competence in using a personal computer and data processing, analysis, and presentation applications, at least from the Microsoft Office package (Word, PowerPoint, Excel, Outlook).

### 5. Conditions (if applicable)

5.1 Conditions for lectures	Appropriate rooms for doctoral teaching activities, equipped with multimedia equipment (video projector, PC), with access to the
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	Internet, institutional IT infrastructure, and specialized resources necessary for the processing, visualization, and interpretation of experimental data. Compliance with institutional regulations regarding the organization of doctoral studies.
5.2 Conditions for seminars	-

## 6. Specific competences accumulated

Professional competences	<ul style="list-style-type: none"> <li>Competence to critically and constructively evaluate scientific research results in relation to the current state of knowledge and the requirements of research quality and integrity;</li> <li>Competence to select and use advanced methods and tools for the processing, analysis, and interpretation of complex experimental data;</li> <li>Competence to interpret research results in an integrated and well-reasoned manner, from multiple methodological and scientific perspectives;</li> <li>In-depth knowledge of data reporting principles and intellectual property requirements related to the use of specialized software applications.</li> </ul>
Transversal competences	<ul style="list-style-type: none"> <li>Competence to initiate and develop research approaches based on critical analysis and advanced data synthesis;</li> <li>Competence to take responsibility for the use and communication of research results;</li> <li>Competence to integrate sound methodological and ethical practices into doctoral research activities.</li> </ul>

## 7. Course Objectives (derived from the acquired competences)

7.1. General objective	Deepening the competence of doctoral students to analyze, interpret, and communicate scientific research results through the use of advanced tools for processing, visualization, and reporting of experimental data, in compliance with methodological, ethical, and academic integrity standards.
7.2. Specific objectives	<p>Upon completion of the course, the doctoral student will acquire the competence to:</p> <ul style="list-style-type: none"> <li>use modern tools for the analysis and graphical representation of experimental data;</li> <li>critically interpret processed data in order to support scientific conclusions;</li> <li>apply principles of fair data reporting and intellectual property protection;</li> <li>integrate data analysis results into scientific manuscripts and academic communications.</li> </ul>

## 8. Content

8.1	Lecture Topics	Teaching methods*	Notes (hours / references)
1.	Analysis of experimental data using modern tools	Interactive lecture, explanation, conversation, demonstrative analysis, problematization	(4 hours, [1÷4])
2.	Modern tools for graphical representation of experimental data	Interactive lecture, explanation, conversation, demonstrative analysis, problematization	(4 hours, [1÷4])
3	Data reporting and intellectual property in the use of specialized programs	Interactive lecture, explanation, conversation, demonstrative analysis, problematization	(2.5 hours, [1÷4])

\*In cases of force majeure, teaching activities may be conducted online, in accordance with current legislation.

### Bibliography

- Norris, G.; Duvall, R.; Brown, S.; Bai, S. EPA Positive Matrix Factorization (PMF) 5.0: Fundamentals and User Guide. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, **2014**.
- Wiley. KnowItAll® Software as a Spectral Interpretation Tool. Available online at: <https://sciencesolutions.wiley.com/whitepapers-case-studies> (accessed for educational purposes).
- WaveMetrics. Tools for Igor Pro® Users. Available online at: <https://www.wavemetrics.com/users/tools> (accessed for educational purposes).

4. Wiley. Rights and Permissions Portal. Available online at: <https://www.wiley.com/en-us/permissions> (accessed for educational purposes).

## 9. Learning Outcomes

<b>Knowledge and understanding</b>	<ul style="list-style-type: none"> <li>understand advanced principles of analysis, processing, and interpretation of experimental data obtained in chemical research;</li> <li>acquire competence in the use of modern tools for the graphical representation and reporting of experimental data;</li> <li>understand the requirements for the responsible use of software tools and the protection of intellectual property in research.</li> </ul>
<b>Application and analysis</b>	<ul style="list-style-type: none"> <li>apply advanced tools and methods for the analysis and visualization of complex experimental data;</li> <li>critically interpret processed data in relation to the research objectives and the methodology used;</li> <li>integrate data analysis results into the structure of a scientific manuscript.</li> </ul>
<b>Critical Assessment and Accountability</b>	<ul style="list-style-type: none"> <li>assess the relevance and quality of results obtained through the processing of experimental data;</li> <li>demonstrate responsibility in the use, interpretation, and dissemination of research data;</li> <li>apply sound methodological and ethical practices in reporting scientific research results;</li> </ul>
<b>Academic Communication</b>	<ul style="list-style-type: none"> <li>communicate the results of experimental data analysis coherently and logically in academic contexts;</li> <li>use appropriate scientific language in the graphical and written presentation of data and conclusions;</li> <li>substantiate interpretations and conclusions based on the analyzed data.</li> </ul>

## 10. Correlation of the course content with the expectations of community representatives, professional associations, and representative employers in the field related to the program.

The content of the course *Experimental techniques, processing and interpretation of research results – Module II* is aligned with the requirements of the academic environment and scientific research by developing the competence necessary for the rigorous analysis, interpretation, and reporting of experimental data, in order to ensure the development and dissemination of doctoral research results under conditions of quality and academic integrity.

After completing the discipline, the doctoral student will acquire the competence to select and use appropriate methods and tools for data processing, as well as the ability to prevent ethical and integrity issues in research during the preparation of scientific manuscripts.

## 11. Assessment

Activity	11.1 Assessment criteria	11.2 Assessment methods	11.3 Weight in final grade (%)
11.4 Course	Correctness, coherence, and the ability to interpret the addressed issues.	Colloquium – oral presentation on the use of modern data analysis and representation tools.	100
11.5 Seminar			
<b>11.6 Minimum Performance Standard</b>			
In order to pass the discipline, the doctoral student must demonstrate: <ul style="list-style-type: none"> <li>correct use of tools for the analysis and representation of experimental data;</li> <li>coherent and well-reasoned interpretation of the obtained results;</li> <li>adherence to the principles of ethics and integrity in the use and reporting of research data.</li> </ul>			

Date of completion  
26.09.2024

Course coordinator

Seminar coordinator

Date of approval

Director of the Doctoral School of Chemistry  
Prof. univ. dr. habil. Cecilia ARSENE