

## COURSE DESCRIPTION

### *Practical Activities of Research - Development*

Academic year 2026 - 2027

#### 1. Programme-related data

1.1. Higher Education Institution	"Babeş-Bolyai" University
1.2. Faculty	Faculty of Chemistry and Chemical Engineering
1.3. Department	Department of Chemical Engineering
1.4. Field	Chemical Engineering
1.5. Level of study	Master
1.6. Degree programme / Qualification	Advanced Chemical Process Engineering
1.7. Form of education	Full time education

#### 2. Course-related data

2.1. Course title	<b>Practical Activities of Research - Development</b>			Course code	<b>CME7342</b>
2.2. Course coordinator	-				
2.3. Seminar coordinator	Scientific supervisor of the dissertation thesis				
2.4. Year of study	II	2.5. Semester	4	2.6. Type of assessment	<a href="#">Progress check</a>
2.7. Course status	<a href="#">Compulsory</a>			2.8. Course type	<a href="#">Specialisation subject</a>

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

3.1. Number of hours per week	<b>9</b>	of which: 3.2. course		3.3. seminar/ laboratory/ project	<b>9</b>
3.4. Total of hours in the curriculum	<b>126</b>	of which: 3.5. course		3.6. seminar/ laboratory	<b>126</b>
<b>Time allocation for individual study (IS) and self-taught activities (ST)</b>					<b>hours</b>
Learning from textbooks, course materials, bibliography, and notes (IS)					12
Additional research in the library, on subject-specific electronic platforms, and on-site					25
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					72
Tutoring (professional guidance)					12
Examinations					3
Other activities					-
<b>3.7. Total hours of individual study (IS) and self-taught activities (ST)</b>				<b>124</b>	
<b>3.8. Total hours per semester</b>				<b>250</b>	
<b>3.9. Number of credits</b>				<b>10</b>	

#### 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	Not applicable
5.2. seminar/laboratory-related	<ul style="list-style-type: none"> <li>• The students will attend the program of preparation of the dissertation paper established by the scientific advisor of the dissertation</li> <li>• The students will prepare the documentation using the existing sources both in the specialized libraries, in the international electronic databases, and in those provided by the scientific advisor of the dissertation.</li> <li>• The students will attend the laboratory with safety equipment</li> </ul>

	(overall, gloves, goggles). •The students will know the goals, means, stages of the laboratory works they are going to attend. •The reports / reviews will be presented and delivered to the scientific advisor of the dissertation
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#### 6.1. Competencies resulting from the completion of the degree programme (as referred to in the curriculum)<sup>1</sup>

Professional competencies	
Competency code	Competency
PC1	Description, analysis and use of elaborate theories and concepts in the fields of chemistry and process advanced chemical engineering.
PC2	Technological design of processes, equipment and apparatus specific to process engineering for the improvement of performances of biochemical and chemical processes by using computer-assisted instruments (CAD) and principles of longterm development.
PC3	Development and use of mathematical models and simulators in process engineering for diagnosis of problems, analysis of optimum operating systems and control of (bio)chemical processes.
PC4	Development of processes, apparatus and equipment specific to process engineering by promoting new solutions for process intensification, optimum operation and control.
PC5	Identifying and defining a research theme in the field of chemical engineering process, elaboration and implementation of a plan for achieving the objectives proposed and valuing the scientific research results obtained.
PC6	Quality and resource management in process engineering by applying the systemic approach and the principles of longterm development.
Transversal competencies	
Competency code	Competency
TC1	Independent execution of complex professional assignments and autonomous development of project-research activities by using computer-assisted techniques and by observing the norms of professional ethics and moral conduct.
TC2	Planning, monitoring, and assuming the duties of a subordinate professional group. Demonstrating the capacity of coordination, analytical thinking, adaptability and flexibility, collaboration with team members.
TC3	Self-assessment of professional performances and determining the continuous training needs, permanent information and documentation in the field of activity and related areas, according to the needs of the labour market.

#### 6.2. Learning outcomes relevant to the degree programme (as referred to in the curriculum)<sup>2</sup>

Learning outcomes targeted by the subject		
Competency code	Knowledge and comprehension	Specific academic skills
PC2 TC1	1. Performing a critical analysis based on CAD tools, to identify possible solutions to complex problems of designing equipment and plants in a chemical process	1. Development of integrated projects, based on CAD tools, for the creative development of the design of devices, equipment and plants in the chemical process industries
PC6 CT2	2. Knowledge of concepts and theories specific to resources and quality management for process engineering, in the context of sustainable development	2. Use of qualitative and quantitative methods for assessing risk factors, operational safety and management, in the development of new projects for resources and quality management

<sup>1</sup> 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.

<sup>2</sup> 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.

## 7. Subject-specific learning outcomes

Knowledge and comprehension
1. Capacity to apply the chemical process engineering knowledge in the realization of the proposed goals in the chosen research subject in order to achieve original results and capitalize the results of the scientific research
2. Ability to recognize the types of technologies in the chemical process engineering and the practical applications
3. Ability to use the modelling, simulation, and conduct of the pilot/industrial software applications.
4. Ability to use/ build the functional laboratory/pilot installations for various chemical processes.
Specific academic skills
1. Use of fundamental and applicative concepts acquired by the student at the disciplines stipulated in the curriculum and studied during the master and bachelor program, in the development of the research activities.
2. Achievement of the proposed research plan by preparing the experimental research works/elaboration of original applications.
3. Acquisition of the needed knowledge for collecting, interpreting, analysing and systematizing the experimental data.
4. Proper selection and use of the assessment methods for the pertinent interpretation of the research results by drawing conclusions and arguing the proposed solutions.

## 8. Contents

8.2. Seminar/ laboratory	Teaching and learning methods	Remarks
8.1.1. Preparation of the experimental activities/applications for the achievement of the originality elements in the dissertation.	Explanation; Conversation; Description; Conceptualization	12
8.1.2. Achievement of the experimental activities/original applications.	Explanation; Conversation; Description; Conceptualization	48
8.1.3. Collection and interpretation of original experimental data/results of original applications.	Explanation; Conversation; Description; Conceptualization	20
8.1.4. Analysis and systematization of original experimental results/results of original applications.	Explanation; Conversation; Description; Conceptualization	18
8.1.5. Underlying the relevance of the original results obtained in the context of the literature.	Explanation; Conversation; Description; Conceptualization	12
8.1.6. Hearing scientific defenses (conferences, symposiums, public defenses of doctoral theses).	Explanation; Conversation; Description; Conceptualization	8
8.1.7. Presentation of the final experimental results/final results of the applications.	Explanation; Conversation; Description; Conceptualization	8
<b>Bibliography</b> 1. Bibliographical sources mentioned in the course syllabus of the curriculum for the ICAP program. 2. Electronic databases (Science Direct, Scopus, SpringerLink, Web of Science, Wiley Journals, Proquest Journals, etc.) 3. The bibliographical sources indicated by the scientific advisor of the dissertation..  Note: The bibliographical elements can be consulted at the Library of the Department of Chemical Engineering, at the Library of the Faculty of Chemistry and Chemical Engineering – extension of the “Lucian Blaga” Central Library of the “Babeş-Bolyai” University, and the “Lucian Blaga” Central Library.		

## 9. Evaluation

Type of activity	9.1 Evaluation criteria <sup>3</sup>	9.2 Evaluation methods <sup>4</sup>	9.3 Percentage in the final grade
9.4. Course	-	-	-
9.5. Seminar/ laboratory	Development of the appropriate methods, techniques and instruments for the preparation and achievement of the research objectives with original character	Evaluation of the techniques and instruments chosen for preparing and achieving the research objectives with original character	10 %
	Method of execution of the scientific papers with original character; collection and interpretation of final experimental data / final application results	Evaluation of the manner of execution of the scientific papers with original character; collection and interpretation of final experimental data / final application results.	70%
	Correctness, completeness and argumentation of the analysis and systematization of the obtained original results	Evaluation of the correctness, completeness and argumentation of the analysis and systematization of the obtained original results	10 %
	Presentation of the report / review with the final experimental data / final applications according to the chosen research topic	Evaluation of the paper presentation with final experimental data/final application results.	10 %
9.6 Minimum standard for passing			
<ul style="list-style-type: none"> <li>• The mark 5 (five) for the assessment of each of the assessment criteria.</li> <li>• Knowledge of the main means of documentation for the research in the field of computer assisted chemical process engineering.</li> </ul>			

## 10. SDG labels (Sustainable Development Goals)<sup>5</sup>

	<input type="radio"/>	Sustainable Development Generic Label						
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<sup>3</sup> 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.

<sup>4</sup> Both final evaluation methods and ongoing evaluation strategies should be established.

<sup>5</sup> 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."

 10 INEGALITĂȚI REDUSE	 11 ORASE ȘI COMUNITĂȚI DURABILE	 12 CONSUM ȘI PRODUCȚIE RESPONSABILĂ	 13 ACȚIUNE CLIMATICĂ	 14 VIAȚĂ ACVATICĂ	 15 VIAȚĂ TERESTRĂ	 16 PACE, JUSTIȚIE ȘI INSTITUȚII EFICIENTE	 17 PARTENERIATE PENTRU REALIZAREA OBIECTIVELOR	No label applies
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Date of entry:  
23.04.2026

Signature of course coordinator

Signature of seminar coordinator

Scientific supervisor

Scientific supervisor

Date of approval in the department:  
29.04.2026

Signature of the head of department

Prof. habil. dr. eng. Graziella L. Turdean