COURSE DESCRIPTION

Pharmaceutical Products Engineering

Academic year 2026 - 2027

1. Programme-related data

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

2. Course-related data

2.1. Course title	Pharmaceutical Products Engineering					Course code	**CME7347**
2.2. Course coordinator	Lect. dr. eng. Lucian Cristian POP						
2.3. Seminar coordinator	Lect. dr. eng. Lucian Cristian POP						
2.4. Year of study	II	2.5. Semester	4	2.6. Type of assessment	Exam		
2.7. Course status	Optional			2.8. Course type	Specialisation subject		

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

3.1. Number of hours per week	4	of which: 3.2. course	2	3.3. laboratory	2
3.4. Total of hours in the curriculum	56	of which: 3.5. course	28	3.6. laboratory	28
Time allocation for individual study (IS) and self-taught activities (ST)					**hours**
Learning from textbooks, course materials, bibliography, and notes (IS)					20
Additional research in the library, on subject-specific electronic platforms, and on-site					34
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					10
Tutoring (professional guidance)					2
Examinations					3
Other activities					
3.7. Total hours of individual study (IS) and self-taught activities (ST)				69	
3.8. Total hours per semester				125	
3.9. Number of credits				5	

4. Prerequisites (where applicable)

4.1. curriculum-related	
4.2 skills-related	

5. Specific conditions (where applicable)

5.1. course-related	
5.2. seminar/laboratory-related	

6.1. Competencies resulting from the completion of the degree programme *(as referred to in the curriculum)*[1]

[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

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 apparata 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.
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

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**
PC6 **PT2**	Knowledge of concepts and theories specific to resources and quality management for process engineering, in the context of sustainable development	Use of qualitative and quantitative methods for assessing risk factors, operational safety and management, in the development of new projects for resources and quality managemen

7. Subject-specific learning outcomes

Knowledge and comprehension
1. Knowledge of advanced concepts for analysis, intensification and synthesis of processes, devices and equipment specific to process engineering in pharmaceutical industry
2. Knowledge of scientific research strategies, setting the program of experiments and simulations, explanation and interpretation of the results for the elaboration of research projects in pharmaceutical industry
Specific academic skills
1.The conception, systematic planning, and execution of an independent scientific research project within the pharmaceutical industry, achieved through the integration of advanced chemical engineering principles, computer-aided design methodologies, and established ethical frameworks

8. Contents

8.1. Course	**Teaching and learning methods**	**Remarks[3]**
1. The features of pharmaceutical industry		
2. Pharmaceutical agents and therapeutically area		
3. Chemiotherapics		
4. Antiinfectives I		
5. Antiinfectives II		

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.

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

6. Neuropharmaceuticals I	Interactive lecture	
7. Neuropharmaceuticals II		
8. Cardiovascular drugs		
9. Antiinflamatory-Antireumatic drugs		
10. Gastrointestinal drugs		
11. Endocrine and metabolic drugs		
12. Related technologies		
13. Pharmaceutical dosage forms		
14. Drug testing		

Bibliography

1. D. J. am Ende, M. T. am Ende, Chemical engineering in the pharmaceutical industry - drug product design, development and modeling, John Wiley & Sons, 2019
2. J. Roy, An introduction to pharmaceutical sciences - Production, chemistry, techniques and technology, Woodhead Publishing, 2011
3. G. L. Patrick, An Introduction to Medicinal Chemistry, Oxford University Press, 2023
4. J. J. Li, Current Drug Synthesis, Wiley, 2022

8.2. Seminar/ laboratory	**Teaching and learning methods**	**Remarks**
8.2.1. Labour protection in the laboratory. Pharmaceutical industry. Equipment. Operations. Drawings	Discussion of technological issues. Experiment.	The number of laboratory hours is grouped in 7 sessions of 4 hours each
8.2.2. Preparation of antiseptic solutions. Synthesis of iodoform.		
8.2.3. Nutritional supplements. Evaluation of antioxidant activity.		
8.2.4. Neuropharmacological agents. Polymorphism. Crystallization.		
8.2.5. Anti-inflammatory drugs. Synthesis of indomethacin (one phase). Drawing up an installation scheme after the technology.		
8.2.6. Benzodiazepines. Synthesizing a phase. Drawing up an installation scheme after the technology.		
8.2.7. Related technologies. Pharmaceutical dosage forms. Disaggregation of the capsules.		

Bibliography

1. L.C. Pop, A. Nicolescu, Elemente de sinteză și tehnologie chimică a medicamentelor, Presa Universitară Clujeană, 2026
2. D. J. am Ende, M. T. am Ende, Chemical engineering in the pharmaceutical industry - drug product design, development and modeling, John Wiley & Sons, 2019
3. J. Roy, An introduction to pharmaceutical sciences - Production, chemistry, techniques and technology, Woodhead Publishing, 2011
4. G. L. Patrick, An Introduction to Medicinal Chemistry, Oxford University Press, 2023
5. J. J. Li, Current Drug Synthesis, Wiley, 2022
6. Specialized scientific articles

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	The ability to establish and to choose the models proper to the studied properties of materials, applying the correct research methods.	Exam (15-20 min ppt presentation)	80 %
9.5. Seminar/ laboratory	Capacity to analyze the models in real applications.	Colloquy	20%
	The activity during the lab work and the quality of reports.		
9.6 Minimum standard for passing			
5 (five) in lab and examination according to the standard			

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
○	○	○	○	○	○	○	○	◉
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:
4/04/2026

Signature of course coordinator

Lect. dr. eng. Lucian Cristian POP

Signature of seminar coordinator

Lect. dr. eng. Lucian Cristian POP

Date of approval in the department:
30.04.2026

Signature of the head of department

Prof.habil.dr.eng. Graziella Liana Turdean.

[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.

[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."*