



UNIVERSITATEA BABEȘ-BOLYAI
BABEȘ-BOLYAI TUDOMÁNYEGYETEM
BABEȘ-BOLYAI UNIVERSITÄT
BABEȘ-BOLYAI UNIVERSITY
TRADITIO ET EXCELLENTIA

Tradiție și Excelență prin
Cultură - Știință - Inovație din 1581



Facultatea de Chimie și Inginerie Chimică

Str. Arany János nr. 11
Cluj-Napoca, cod poștal 400028
Tel.: 0264-59.38.33
Fax: 0264-59.08.18

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SYLLABUS


Design of Experiments

University year 2025

1. Information regarding the programme

1.1. Higher education institution	Universitatea Babeș-Bolyai din Cluj Napoca
1.2. Faculty	Chemistry and Chemical Engineering
1.3. Department	Chemistry and Chemical Engineering of the Hungarian Line of Studies
1.4. Field of study	Chemical Engineering
1.5. Study cycle	Master
1.6. Study programme/Qualification	CHIMIA ȘI INGINERIA NANO- ȘI BIOMATERIALELOR / NANO- ÉS BIOANYAGOK KÉMIAJA ÉS TECHNOLÓGIÁJA/CHEMISTRY AND ENGINEERING OF NANO- AND BIOMATERIALS
1.7. Form of education	Învățământ cu frecvență

2. Information regarding the discipline

2.1. Name of the discipline	Design of Experiments	Discipline code	CMM8232
2.2. Course coordinator	Prof. Paul Serban Agachi		
2.3. Seminar coordinator	Lect. Norbert Muntean		
2.4. Year of study	II	2.5. Semester	2
2.6. Type of evaluation	E	2.7. Discipline regime	DS

3. Total estimated time (hours/semester of didactic activities)

3.1. Hours per week	4	of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4. Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar/laborator	28
Time allotment for individual study (ID) and self-study activities (SA)					hours
3.5.1. Learning using manual, course support, bibliography, course notes (SA)	14				
3.5.2. Additional documentation (in libraries, on electronic platforms, field documentation)					14
3.5.3. Preparation for seminars/labs, homework, papers, portfolios and essays					28
3.5.4. Tutorship					14
3.5.5. Evaluations					14
3.5.6. Other activities:					14
3.7. Total individual study hours	126				
3.8. Total hours per semester	182				
3.9. Number of ECTS credits	5				

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	Statistics, Matrix calculation

5. Conditions (if necessary)



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5.1. for the course	
5.2. for the seminar /lab activities	

6.1. Specific competencies acquired ¹

Professional/essential competencies	<ul style="list-style-type: none">Planning and Organization of an experiment; Data statistical processing; Optimization
Transversal competencies	<ul style="list-style-type: none">Learn and present in a foreign language; understand the complexity of processes, benefitting of an international experience of the lecturer; multicultural experience being taught by a nonhungarian person

6.2. Learning outcomes

Knowledge	Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions.
Skills	The student is able to plan and develop experiments in an efficient way, obtaining results with minimum resources consumption
Responsibility and autonomy:	The student has the ability to work independently to obtain the expected results in a minimum of time

7. Objectives of the discipline (outcome of the acquired competencies)

¹ One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.



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7.1 General objective of the discipline	<ul style="list-style-type: none"> To learn how to design an experiment in optimal conditions
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> Apply the theory to students' practical experiments for dissertation; further application in laboratory or industrial field

8. Content

8.1 Course	Teaching methods	Remarks
1. Overview and Basic Principles	Power point, MATLAB, ANOVA calculations	
2. Statistical modeling (passive and active experiments)	Power point, MATLAB, ANOVA calculations	
3. Block Designs, Latin Squares and Related Designs	Power point, MATLAB, ANOVA calculations	
4. Full Factorial Designs	Power point, MATLAB, ANOVA calculations	
5. 2-level Full Factorial and Fractional Factorial Designs	Power point, MATLAB, ANOVA calculations	
6. Response surface methods and designs	Power point, MATLAB, ANOVA calculations	
7. Evolutionary Operation EVOP	Power point, MATLAB, ANOVA calculations	
8. Industrial case studies	Power point, MATLAB, ANOVA calculations	
Bibliography <ol style="list-style-type: none"> G. Oehlert, A First Course in Design and Analysis of Experiments, University of Minnesota, 2010 G. Box, S. Hunter, Statistics for Experimenters, Wiley, 1993 S. Agachi et.al, Metode statistice de modelare matematica, Editura Ministerului Industriei Chimice, 1971 S. Agachi et.al., Modeling and Optimization of the hydrazine manufacturing process at CC Victoria, IECB Raport cercetare, 1978 		
8.2 Seminar / laboratory	Teaching methods	Remarks
1. Application of Matlab for statistical modeling	Board exercises	
2. 1. Application of ANOVA for statistical modeling	Board exercises	
Bibliography		



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9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The newst trends in resources savings implies the minimum consumption of Time, Human Resources, Energy, Materials. The DOE learn how to reach these goals

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	% solving the problems	Midterm Test	25%
	% solving the problems	Final exam	25%.
10.5 Seminar/laboratory	Percentage delivery homework Active presence in the labs and tutorials	Continuous Assessment (Homework, Project)	50%
10.6 Minimum standard of performance			
A: 90 - 100 B: 80 -89 C: 70 -79 D: 60 -69 E: 0 - 59 50 for the minimum grade			

11. Labels ODD (Sustainable Development Goals)²

	General label for Sustainable Development
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² Keep only the labels that, according to the [Procedure for applying ODD labels in the academic process](#), suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „Not applicable.”.



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Date:
25.03.2025

Signature of course coordinator

Paul

Signature of seminar coordinator

[Signature]

Date of approval:
25.03.2025

Signature of the head of department

Paicu