SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babes-Bolyai University
1.2 Faculty	Chemistry and Chemical Engineering
1.3 Department	Chemical Engineering
1.4 Field of study	Chemical Engineering
1.5 Study cycle	Master
1.6 Study programme / Qualification	Advanced Chemical Process Engineering

2. Information regarding the discipline

2.1 Name of the discipline	**Assessment of risk, safety and security factors – CME7321**						
2.2 Course coordinator	Assoc. Prof. Dr. Eng. Alexandra Csavdári						
2.3 Seminar / laboratory work coordinator	Assoc. Prof. Dr. Eng. Alexandra Csavdári						
2.4. Year of study	II	2.5 Semester	3	2.6. Type of evaluation	C	2.7 Type of discipline	DS (Speciality discipline)

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

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar/laboratory	1/0
3.4 Total hours in the curriculum	42	Of which: 3.5 course	28	3.6 seminar/laboratory	14/0

Time allotment:	hours
Learning using manual, course support, bibliography, course notes	42
Additional documentation (in libraries, on electronic platforms, field documentation)	9
Preparation for seminars/labs, homework, papers, portfolios and essays	42
Tutorship	12
Evaluations	3
Other activities: not the case	-

3.7 Total individual study hours	108
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

4. Prerequisites (if necessary)

4.1. curriculum	• Not the case
4.2. competencies	• Not the case

5. Conditions (if necessary)

5.1. for the course	• The students will turn off their mobile phones • Delays will not be tolerated
5.2. for the seminar /lab	• Students will bring to the laboratory practice their course notes and

activities	appropriate calculus device • Students will turn off their mobile phones • Delays will not be tolerated

6. Specific competencies acquired

Professional competencies	• Definition of notions, concepts, theories and advanced models in the field of chemistry and chemical process engineering as well as their adequate use within the professional community. • Use of advanced knowledge in the field of chemistry and chemical process engineering to explain and interpret chemical processes as well as their elements of risk and safety. • Identification and proper usage of concepts, method and theories for solving new complex problems of risk management within chemical process engineering. • Critical analysis and usage of principles, methods and advanced work techniques for quantitative and qualitative assessment of chemical process engineering.
Transversal competencies	• Independent execution of complex professional duties and research projects using computer-aided techniques and comply with professional ethics and moral. • Planning, monitoring and assuming professional duties of underline group. Proving the coordination capabilities, analytical thinking, adaptability and flexibility, collaboration with team members. • Auto-evaluation of professional performances and establish the needs of continuous learning, documentation in the work fields in correlation with the labour market.

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

7.1 General objective of the discipline	• Introduction and evaluation of risk and operational safety factors.
7.2 Specific objective of the discipline	• Ability to qualitatively and quantitatively assess de risk and operational safety factors within a process • Ability of management and operational solution proposal for avoiding as well as coping with risky situations

8. Content

8.1 Course	Teaching methods	Remarks
8.1.1. Introduction. Definition of specific concepts.	Presentation; Explanation, Conversation; Description; Debate	
8.1.2. Basic concept regarding events and their probability.	Presentation; Explanation, Conversation; Description; Debate	
8.1.3. Models and framework. Simulation and reality.	Presentation; Explanation, Conversation; Description; Debate	
8.1.4. Deterministic and probabilistic methods. Random and epistemic uncertainty.	Presentation; Explanation, Conversation; Description; Debate	
8.1.5. Safety, risk and reliability	Presentation; Explanation, Conversation; Description; Debate	
8.1.6. Risk, its nature, the risk index.	Presentation; Explanation, Conversation; Description; Debate	
8.1.7. Consequences of breaking. Stages of basic risk evaluation.	Presentation; Explanation, Conversation; Description; Debate	
8.1.8. Qualitative assessment techniques. The risk	Presentation; Explanation,	

matrix. The tree method. Chain of events.	Conversation; Description; Debate	
8.1.9. Markov chains. Effect analysis.	Presentation; Explanation, Conversation; Description; Debate	
8.1.10. Quantitative assessment techniques. Probabilistic assessment – part 1.	Presentation; Explanation, Conversation; Description; Debate	
8.1.11. Quantitative assessment techniques. Probabilistic assessment – part 2.	Presentation; Explanation, Conversation; Description; Debate	
8.1.12. Semi-quantitative assessment techniques.	Presentation; Explanation, Conversation; Description; Debate	
8.1.13. Integrated risk analysis techniques.	Presentation; Explanation, Conversation; Description; Debate	
8.1.14. Case studies.	Presentation; Explanation, Conversation; Description; Debate	
Bibliography 1. Alexandru Ozunu, Călin Anghel: Evaluarea riscului tehnologic şi securitatea mediului, Ed. Accent, Cluj-Napoca, 2007. 2. Török Zoltán, Ajtai Nicolae, Ozunu Alexandru: Aplicaţii de calcul pentru evaluarea riscului producerii accidentelor industriale majore ce implică substanţe periculoase, Ed. EFES, Cluj-Napoca, 2011. 3. Gheorghe Maria: Evaluarea cantitativă a riscului proceselor chimice şi modelarea consecinţelor accidentelor, Ed. Printech, Bucureşti, 2007. 4. Meyer Thierry, Reniers Genserik: Engineering Risk Management, DeGruyter, Berlin, 2013.		
8.2 Seminar	Teaching methods	Remarks
8.2.1. Simulation models based on deterministic principles.	Explanation, Conversation; Description; Debate; Problem solving	
8.2.2. Simulation models based on probabilistic principles.	Explanation, Conversation; Description; Debate; Problem solving	
8.2.3. Hazard identification.	Explanation, Conversation; Description; Debate; Problem solving	
8.2.4. Risk factor identification.	Explanation, Conversation; Description; Debate; Problem solving	
8.2.5. Elementary assessment of risk factors. Various methods.	Explanation, Conversation; Description; Debate; Problem solving	
8.2.6. Scenarios and case studies.	Explanation, Conversation; Description; Debate; Problem solving	
Bibliography 1. Török Zoltán, Ajtai Nicolae, Ozunu Alexandru: Aplicaţii de calcul pentru evaluarea riscului producerii accidentelor industriale majore ce implică substanţe periculoase, Ed. EFES, Cluj-Napoca, 2011. 2. Meyer Thierry, Reniers Genserik: Engineering Risk Management, DeGruyter, Berlin, 2013.		

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

- By instructing the theoretical and practical concepts of **Assessment of risk, safety and security factors** course, the students will get the knowledge in accordance with the competencies requested by possible employment sectors stetted by RNCIS.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the

			grade (%)
10.4 Course	Correctness of answers – proper understanding and learning of concepts discussed during lectures; Correct use of learned concept within new contexts. Correct solving of problems as inherent part of examination subjects.	Written colloquia. Proven or intended fraud is treated according to the ECST rules of UBB.	100 % (Each module contributes to the final mark with one third that is with 33.3 %)
10.5 Seminar	Correctness of answers – proper understanding and learning of concepts discussed during class; Correct use of learned concept within new contexts.	Evaluated by means of problems to be solved, as inherent part of the colloquia subjects.	-

10.6 Minimum performance standards
➢ Grade 5 (five) at the written colloquia. ➢ Adequate knowledge and usage of discussed concepts and methods.

Date	Signature of course coordinator	Signature of seminar coordinator
April the 25th, 2016	Assoc. Prof. Dr. Eng. Alexandra. Csavdári	Assoc Prof. Dr. Eng. Al. Csavdári

Date of approval	Signature of the head of department
April the 125th, 2016	Assoc. Prof. Dr. Eng. G. L. Turdean