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	**ICAP/ Master**

2. Information regarding the discipline

2.1 Name of the discipline	**Green Chemistry-Theoretical and Technological Aspects /** CMX7141						
2.2 Course coordinator	**Assoc prof. . Dr. CRISTEA CASTELIA**						
2.3 Seminar coordinator	Assoc prof. Dr. CRISTEA CASTELIA						
2.4. Year of study	**I**	2.5 Semester	**II**	2.6. Type of evaluation	**C**	2.7 Type of discipline	**Optional**

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

3.1 Hours per week	3	Of which: 3.2 course	2	3.3 seminar	1
3.4 Total hours in the curriculum	42	Of which: 3.5 course	28	3.6 seminar	14
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					32
Preparation for seminars/labs, homework, papers, portfolios and essays					50
Tutorship					3
Evaluations					3
Other activities:					

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	• No
4.2. competencies	• No

5. Conditions (if necessary)

5.1. for the course	• The mobile telephones must be switched off during course and seminar
5.2. for the seminar	• Not necessry

6. Specific competencies acquired

Professional competencies	Mastering the principles of "Green Chemistry" as methodology for achieving sustainability in the chemical industry. Using chemical knowledge for environmentally friendly chemistry. Formulate, develop and apply creative solutions for strategic problems by promoting innovative chemical technologies that reduce or eliminate the use or generation of hazardous substances in the design, manufacture and use of chemical products
Transversal competencies	• Team working and professional task • Documentation in foreign languages using the new information and comunication technologies.

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

7.1 General objective of the discipline	• To familiarize the students with the green chemistry concept, with the theoretical and technological aspects of sustainable chemical processes.
7.2 Specific objective of the discipline	• To understand the principles of Green Chemistry concept • Life Cycle Assesment of chemical products • To develop abilities in planning strategies of sustainable development

8. Content

8.1 Course	Teaching methods	Remarks
1. The 12 principles of Green Chemistry, definition and specific concepts	Lecture	1
2. Prevention of waste formation in chemical industry	Lecture	1
3. Life cycle assessment	Lecture	1
4. Catalysis in chemical synthesis	Lecture	2
5. Non polluting solvents in chemical processes	Lecture	2
6. Renewable resources for the chemical industry	Lecture	2
7. Alternative energy sources for chemical processes	Lecture	2
8. Designing nonpolluting processes	Lecture	1
9. Case studies	Demonstrating	2

Bibliography

1. P. T. Anastas, J. C. Warner "*Green Chemistry Theory and Practice*" Oxford Univ. Press, 1998.
2. M. Lancaster "*Green Chemistry an introductory text*" Pub. The Royal Society of Chemistry, 2002
3. P. Tundo, A. Perosa, F. Zechinni, *Methods and Reagents for Green Chemistry*" J. Wiley and Sons, 2007.
4. W. M. Nelson, *Green solvents for chemistry: perspectives and practice*, Oxford Univ. Press, 2003.
5. M. Doble, A. K. Kruthiventi *Green Chemistry &Engineering*, Elsevier Sci & Technol. Books, 2007.

8.2 Seminar	Teaching methods	Remarks
1. The 12 principles of Green Chemistry, definition and specific concepts	Collaborative discussions	1
2. Life Cycle Assesment of sulphuric acid	Collaborative discussions	1
3. Life Cycle Assesment of phenol	Collaborative discussions	1
4. Life Cycle Assesment of anilin	Collaborative discussions	1

5. Life Cycle Assesment of synthetic fibers	Collaborative discussions	1
6. Life Cycle Assesment of plastic materials	Collaborative discussions	2

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 content of this discipline is based on a modern/critical approach of chemical processes employed in the fabrication of synthetic materials useful for chemical engineers in both production and marketing areas, as well as for the professional development towards a scientific carrier (research, doctoral studies).

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Knowledge of the concepts of green chemistry Abilities to use the concepts of gren chemistry in the analysis of industrial processes	Written report *in extenso* of a case study Oral presentation with ppt support of the same case study Answer to questions formulated by the examiner	50% 20% 20%
10.5 Seminar	Understanding of the concepts presented during the teaching activities	Home work	10%
	Adequate use of concepts	Answer to questions formulated by the examiner	
10.6 Minimum performance standards			
Enumeration of the green chemistry principles			

Data completării 15.05.2014

Semnătura titularului de curs .....

Semnătura titularului de seminar .....

Data avizării în departament

25.05.2014

Semnătura directorului de departament

Prof. dr. Cristian Silvestru