SYLLABUS

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty[1]/ Department [2]	Chemical Engineering, Biotechnologies and Environmental Protection/ CAICON
1.3 Field of study (name/code[3])	Chemical Engineering / 10.30.50
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	Chemical Engineering / 10.30.50.60/engineer

2. Information about the discipline

2.1 Name of discipline/ formative category[4]			Simulators of chemical and biochemical processes / DS				
2.2 Coordinator (holder) of course activities			S.L.dr.ing. Ana-Maria PANĂ				
2.3 Coordinator (holder) of applied activities[5]			S.L.dr.ing. Ana-Maria PANĂ				
2.4 Year of study[6]	IV	**2.5** Semester	7	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DO

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [8]

3.1 Number of fully assisted hours / week	3.5 of which:	**3.2** course	1.5	**3.3** seminar / laboratory / project	0/2/0
3.1* Total number of fully assisted hours / semester	49 of which:	**3.2*** course	21	**3.3*** seminar / laboratory / project	0/28/0
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	3.64 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1.14
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			1.5
3.7* Number of hours of unassisted activities / semester	51 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			16
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			21
3.8 Total hours / week [9]	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

4.1 Curriculum	• Physical Chemistry, Hydrodynamics, Heat and mass transfer, Chemical/Biochemical Reactors

[1] The name of the faculty which manages the educational curriculum to which the discipline belongs
[2] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[3] The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.
[4] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[5] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] Year of studies in which the discipline is provided in the curriculum.
[7] Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).
[8] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[9] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.2 Competencies	• Basic knowledge in the field of chemical and biochemical engineering

5. Conditions (where applicable)

5.1 of the course	• Classroom provided with writing board and videoprojector
5.2 to conduct practical activities	• Laboratory class provided with computers and adequate software

6. Specific competencies acquired through this discipline

Specific competencies	• Simulation of industrial plants from chemical and biochemical field, dimensioning and selection of equipment from the technological flow. • Understanding the functioning principles of an industrial plant, identification of key-parameters of the technological process.
Professional competencies ascribed to the specific competencies	• - Analyse production processes for improvement; • - Manage chemical testing procedures; • - Test materials; • - Write technical reports • -Performs chemical experiments • -Approve engineering design • -Assess environmental impact

Transversal competencies ascribed to the specific competencies

- - Conduct quality control;
- - Apply scientific, technological and engineering knowledge;
- - Uses equipment, instruments or technological equipment accurately.

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7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• The main objective of the discipline is to provide know-how regarding the simulation of chemical/biochemical industrial processes.
7.2 Specific objectives	• The ability to understand the principles of chemical/biochemical processes simulation. Validation of chemical/biochemical process simulation • The ability to operate a simulation/design software in the field of chemical/biochemical engineering

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
Simulation of technological processes in chemical/biochemical engineering: definition, stages of simulation and specific tools.	3	Interactive teaching skills, lecture, demonstration, problem solving, cooperation teaching. Video-projector lecture
Continuous and discontinuous processes. Databases involved in process simulation	3	
Simulation techniques in chemical/biochemical field. Identification of initial simulation parameters.	3	

[10] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".

[11] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Software used in chemical/biochemical process simulation. Examples. Trends and fields of development for simulation software	3	and black-board explanations for knowledge consolidation.
Technological flows, thermodynamic models and physico-chemical properties of chemical compounds	3	
Aspen Hysys software operation. Case studies: unitary operations	3	
Reactors/bioreactors and distillation equipment simulation in Aspen Hysys	3	

Bibliography [12] 1. Towler G., Sinnot R., Chemical engineering design, Principles, Practice and Economics of Plant and Process Design, Elsevier Inc., 2008

2. Finlayson B.A., Introduction to Chemical Engineering Computing, Wiley, 2006

3. Froment G.F., Bischoff K.B., de Wilde J., Chemical Reactor Analysis and Design, 3rd Edition, Jon Wiley and Sons, 2010

4. Moran S., An Applied Guide to Process and Plant Design, Elsevier, 2019

5. Pană Ana-Maria, Proiectare asistată, note de curs, disponibil online https://cv.upt.ro/course/view.php?id=2273

8.2 Applied activities [13]	Number of hours	Teaching methods
Introduction into Aspen Hysys: properties interface, flowsheet, PFD, equipment pallete	3	Display and use of software for design and simulation of processes from chemical/biochemical engineering
Unitary operations in Aspen Hysys: mixers/spliters, pumps, separators, compressors, etc.	3	
Distillation in Aspen Hysys	3	
Reactors/bioreactors in Aspen Hysys	4	
Absorbers in Aspen Hysys	3	
Simulation of recirculation processes in Aspen Hysys	4	
Simulation of a biodiesel plant in Aspen Hysys	4	
Simulation of an anaerobic biogas plant. Safety issues.	4	

Bibliography [14] 1. Schefflan R., Teach yourself the basics of Aspen Plus, John Wiley and Sons, 2011

2. Pleşu V., Iniţiere în utilizarea simulatorului HYSYS, vol. 1-2, Editura Bren, 2001

3. https://www.aspentech.com/en/products/pages/aspen-process-manual

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- The syllabus is developed according to the requirements in the chemical/biochemical engineering field, being similar to other disciplines from Romanian universities and abroad.
- The syllabus was written considering the requirements and expectations of the employers in the field. These aspects were identified during discussions between Chemical Engineering Board members; economical environment is well represented with distinguished representatives among this Board.
- The competencies acquired will be of great use for employes working in chemical plants, but also in research and development facilities, including design of chemical equipment.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade

[12] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.

[13] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".

[14] At least one title must belong to the discipline team.

[15] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

10.4 Course	Fundamentals of chemical/biochemical process simulation	Written examination	0.66
10.5 Applied activities	**S:**		
	L: Attendance to all applicative activities. Good use of Aspen Hysys software	Quiz	0.34
	P[16]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [17])			
• Basic knowledge in simulation of chemical/biochemical processes; • Attendance at all laboratory sessions			

Date of completion	**Course coordinator (signature)** Ș.L.dr.ing. Ana-Maria PANĂ	**Coordinator of applied activities (signature)** Ș.L.dr.ing. Ana-Maria PANĂ
Head of Department (signature) S.L.dr.ing. Andra TĂMAȘ	**Date of approval in the Faculty Council** [18]	**Dean (signature)** Ș.L.dr.ing. Mircea Laurențiu DAN

[16] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.
[17] It will not explain how the promotion mark is awarded.
[18] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.