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]			Fermentative processes / DS				
2.2 Coordinator (holder) of course activities			Conf.dr.ing. Anamaria TODEA				
2.3 Coordinator (holder) of applied activities[5]			.....				
2.4 Year of study[6]	IV	**2.5** Semester	8	**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	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	0/2/0
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**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	6.71 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			
		hours of individual study after manual, course support, bibliography and notes			
		training seminars / laboratories, homework and papers, portfolios and essays			
3.7* Number of hours of unassisted activities / semester	94 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			
		hours of individual study after manual, course support, bibliography and notes			
		training seminars / laboratories, homework and papers, portfolios and essays			
3.8 Total hours / week [9]	10.71				
3.8* Total hours /semester	150				
3.9 Number of credits	6				

4. **Prerequisites** (where applicable)

4.1 Curriculum	• Biochemistry, organic chemistry
4.2 Competencies	•

[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.

5. Conditions (where applicable)

5.1 of the course	• Lecture room, equipped with: blackboard, video projector and computer • Students will come to class with their mobile phones turned off • • Student participation in the course according to the regulations in the APPENDIX TO H.S. NO. 233 of 15.09.2016, APPENDIX no. 4 of the UPT Charter in force
5.2 to conduct practical activities	• Spaces and facilities: • Specialized laboratory for fermentative processes, • Student obligations: • Compliance with labor protection rules and instructions in the laboratory • Use of personal protective equipment • The correct use of equipment, utensils and materials from the laboratory equipment • Elaboration and support of a project on a topic assigned at the first laboratory session • The performance of practical laboratory work by students is conditioned by the acquisition of minimum knowledge presented in the laboratory report. In this sense, students will take laboratory tests before each practical work and the minimum grade for the practical performance of the work must be 5.00. Otherwise, the student acknowledges that he cannot participate in the practical work, which will be recovered in separate sessions according to the regulation in the APPENDIX TO H.S. NO. 233 of 15.09.2016, APPENDIX no. 4 of the UPT Charter in force •

6. Specific competencies acquired through this discipline

Specific competencies	• Developing the ability to identify new developments in fermentation processes • Understanding, describing and using the main phenomena involved in fermentation processes • Exploitation of bioprocesses, with the application of engineering knowledge • Creative application of analysis and characterization methods specific to fermentation technologies • Management and monitoring of fermentation technologies, identification of critical points and resolution • problems under conditions of qualified assistance
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	• Assimilation of knowledge in the field of fermentation technologies, with emphasis on the biotechnological foundation of the studied processes and capacity development • to identify new directions in the engineering of these processes

7.2 Specific objectives	• Identifying the essential elements of a fermentation process in the food industry; Application of methods, techniques, procedures and appropriate tools for solving technical problems in the implementation of fermentation processes

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. Introduction: 1.1. Basic principles of fermentation processes 1.2. Types of fermentation processes	2	Lecture, use of video projector, resources in electronic format
2. Microorganisms and culture media used in fermentation processes Types of microorganisms, Selection and improvement of microorganisms, Establishing the composition of the culture medium Sterilization of culture media and equipment used	4	
3. Fermentative processes in the technology of alcoholic beverages 3.1. Raw materials 3.2. Saccharification of starchy or cellulosic raw materials 3.3. Alcoholic fermentation 3.4. Obtaining ethanol from fermentation media	4	
4. Technologies for obtaining wine and some wine-based products 4.1. Grape processing technology and must production 4.2. The chemical composition of the must 4.3. Maceration and fermentation 4.4. Malolactic fermentation 4.5. Development phases of wines	6	
5. Technologies in the beer industry 5.1. Raw materials used for brewing beer 5.2. malting 5.3. Obtaining beer wort 5.4. Beer wort fermentation	4	
6. Technologies in the fermented dairy products industry 6.1. Chemical composition of milk and transformations milk components during fermentation processes 6.2. Manufacture of acid fermented dairy products 6.3. New developments in the manufacture of acid fermented dairy products 6.4. Special cheeses	8	
Bibliography [12] 1. C. Banu (coordonator), Manualul Inginerului din Industria Alimentară, Vol. II, Ed. Tehnică, Bucureşti 1999, 2. C. Banu şi colectiv, Biotehnologii în Industria Alimentară, Ed. Tehnică, Bucureşti, 1987 3. H.D. Belitz, W. Grosch, Food Chemistry, Springer Verlag, Heidelberg, 2004. 4. C. Dăescu, Produse de bio- şi semisinteză, Editura Politehnica, Timişoara, 2006. 5. D.E. Briggs, C.A. Boulton, P.A. Brookes, R. Stevens, Brewing Science and Practice, CRC Press, Boca Raton FL, 2004. 7. Y.H. Hui (editor) Dairy Science and Technology Handbook, Vol. I-III, Wiley-WCH, Weinheim,1993		

8.2 Applied activities [13]	Number of hours	Teaching methods
Norms of safety technique and labor protection in the biotechnology laboratory	2	Training, teamwork
Determination of proteins by spectrophotometric methods	4	
Realization of a biotechnological process (bioethanol) at the	22	

[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.).

[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".

laboratory level, including documentation, the creation of the experimental installation, the conduct of the experiments, the calculation and the presentation of the results		
Bibliography [14] 1. A.C. Paul, Biotehnologii în industria alimentară. Lucrări Practice. Editura Politehnica, 2018 2. The Biodiesel Lab, https://www.learningundefeated.org/project/biodiesel-lab/		

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 discipline contributes to the development of the necessary skills to understand and exploit fermentation processes, being consistent with the requirements of employers in the respective field. The procedures that will be discussed in detail during the course lectures will be updated in accordance with recent developments and based on the consultation of professional associations in the field

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Evaluation of knowledge gained	Assessment: oral exam on theoretical subjects and one subject with an applied nature	60%
10.5 Applied activities	**S:**		
	L: Assessment of practical knowledge	Written assessment at each laboratory session	40%
	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])			
• Adequate description of some elements of the components and stages of the biotechnological processes, including a minimal argumentation of the methods, techniques, procedures and tools applied; To advance the discipline, at least grade 5 must be obtained in the written assessment; • Teaching the results of the practical laboratory work, thus demonstrating the acquisition of the knowledge from the respective work; • Promotion of laboratory tests with at least grade			

Date of completion	**Course coordinator (signature)** Conf.dr.ing. Anamaria TODEA	**Coordinator of applied activities (signature)**
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

[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.)
[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.