Name of HEI: Higher School of Biological Sciences of Oran **Departement : Second Cycle**

Syllabus of the Subject
Enzyme engineering 1: Applications to food industries

LECTURE TEACHER		**Omar Khelil**			
		Student reception per week			
Email	omar.khelil.essbo@gmail.com	Day:	Sunday	Hour:	10h00-11h00
Office phone	_	Building:	Educational building	Bureau:	Enzyme Engineering Lab

Tutorial session (Student reception per week)					
NAMES AND FIRST NAMES OF TEACHERS	Reception office/room	Session 1		Session 2	
		Day	Hour	Day	Hour
Omar Khelil	Enzyme Engineering Lab	Saturday	11h00- 12h00-	Monday	15h30- 16h30-

COURSE DESCRIPTION	
Objectives	1. The purpose of this teaching unit is to provide students with rich theoretical content concerning the application of enzyme engineering in the agri-food sector. 2- Understand the fundamental principles of enzyme engineering and its relevance to the food industry, including enzyme structure, function, and regulation. 3- Explore various enzyme engineering techniques and methodologies used in food processing and production, such as protein engineering, immobilization, and optimization strategies. 4- Analyze the role of enzymes in food processing, including their application in enhancing flavor, texture, nutritional value, and shelf-life extension of food products. 5-Evaluate the impact of enzyme engineering on improving food production efficiency, sustainability, and cost-effectiveness within the agri-food sector. 6- Develop critical thinking skills to assess the ethical, safety, and regulatory considerations associated with the use of enzyme engineering in food industries, and propose strategies for responsible implementation.
Type of Teaching Unit	Fundamental Teaching Unit
Succinct Content	Enzyme engineering has revolutionized the food industry by providing new and innovative tools for food processing and preservation. Enzymes are used in various stages of agri-food processes, including food processing, preservation, and waste treatment. Enzymes used in the food industry have a wide range of applications, including the production of food additives, flavorings, and sweeteners, as well as the improvement of food texture, quality, and shelf-life.

	Enzyme engineering plays a crucial role in the food industry as it provides innovative solutions to improve various food-related processes, such as production, preservation, and waste treatment.
Course Credits	4
Course Coefficient	2
Weighting for Participation	5 %
Weighting for Attendance	5 %
Calculation of Average CA	Average CA = (PBL 1 x 0.1) + (PBL 2 x 0.1) + (PBL 3 x 0.1) + (PBL 4 x 0.1) + (PBL 5 x 0.1) + (PBL 6 x 0.4) + (Participation and Attendance x 0.1)
Learning Outcomes	1. Demonstrate a comprehensive understanding of the fundamental principles of enzyme engineering and its significance in the context of the agri-food sector. 2. Apply various enzyme engineering techniques and methodologies to solve specific challenges encountered in food processing and production. 3. Evaluate the effectiveness of enzyme applications in food processing, including their impact on enhancing flavor, texture, nutritional quality, and shelf-life extension of food products. 4. Analyze the role of enzyme engineering in improving food production efficiency, sustainability, and cost-effectiveness within the agri-food industry. 5. Critically assess the ethical, safety, and regulatory implications associated with the utilization of enzyme engineering in food industries and propose strategies for responsible implementation. 6. Communicate effectively about enzyme engineering concepts and their applications in the food industry through written reports, presentations, and discussions. 7. Collaborate with peers to solve real-world problems related to enzyme engineering in food production and processing.

CONTINUOUS ASSESSMENT OF KNOWLEDGE							
FIRST ASSESSMENT (Lecture assessment)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	-	W + CP	Yes	10%	-	A, S, AR
SECOND ASSESSMENT (Lab assessments)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	10 min	W + CP	No	10%	Yes	A, S, AR
THRID ASSESSMENT (Lab assessments)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	10 min	W + CP	No	10%	Yes	A, S, AR
FOURTH ASSESSMENT (Lab assessments)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	10 min	W + CP	No	10%	Yes	A, S, AR
FIFTH ASSESSMENT (Lab assessments)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	10 min	W + CP	No	10%	Yes	A, S, AR
SIXSTH ASSESSMENT (Lab assessments)							
Day	Session	Duration	Type (1)	Permitted documents (Yes, No))	Grading scale	Discussion after evaluation (date of consultation of the copy)	Evaluation criteria (2)
	Tutorial	10 min	W + CP	No	40%	Yes	A, S, AR

(1) W: Written, IP: Individual presentation, CP: Class presentation, EX: Experimentation, MCQ: Multiple-Choice Questions

(2) Evaluation criteria: A: Analysis, S: Synthesis, AR: Argumentation, D: Approach, R: Results

EXPECTATIONS	
Expected from students (Participation-Involvement)	– Active Participation – Inquisitive Attitude – Respectful Engagement – Application of Knowledge
Expectations of the teacher	– Regular Attendance – Preparation – Collaborative Learning – Feedback and Reflection

BIBLIOGRAPHY	
Books and digital resources	1. Kermasha, S., & Eskin, M. N. (Eds.). (2020). Enzymes: Novel Biotechnological Approaches for the Food Industry. Academic Press. 2. Kuddus, M. (Ed.). (2018). Enzymes in food biotechnology: production, applications, and future prospects. 3. Tucker, G. A., & Woods, L. F. J. (Eds.). (1995). Enzymes in food processing. Springer Science & Business Media. 4. Vitolo, M. (2019). overview on downstream procedures for enzyme production. 5. Whitaker, J. R., Voragen, A. G., & Wong, D. W. (Eds.). (2002). Handbook of food enzymology (Vol. 122). CRC Press. 6. Whitehurst, R. J., & Van Oort, M. (Eds.). (2009). Enzymes in food technology. John Wiley & Sons. 7. Yada, R. Y. (Ed.). (2015). Improving and tailoring enzymes for food quality and functionality. Elsevier.

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