

Course Unit	Industrial Microbiology	Field of study	Engineering and related techniques
Master in	Biotechnological Engineering	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	2-1	ECTS credits	5.0
Code	5010-784-1203-00-23		
Workload (hours)	135	Contact hours	T - TP - PL - TC - S - E - OT - O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Paula Cristina Azevedo Rodrigues

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Identify the main features that confer the microorganism the potential industrial interest.
2. Acknowledge the methodologies of prospection, screening and identification of microorganisms with industrial potential.
3. Assess different substrates with potential to be used in bioprocesses.
4. Identify the key parts of an industrial bioprocesses.

Prerequisites

Before the course unit the learner is expected to be able to:
Not applicable

Course contents

Industrial microorganisms: screening, identification and preservation. Industrial substrates. Microbial improvement and genetically modified organisms. Bioprocesses.

Course contents (extended version)

1. Introduction to Industrial Microbiology
 - Industrial Microbiology and its relation with Biotechnology
 - Objectives and applications
 - Classic versus modern Industrial Microbiology
 - Overview of methods and processes
2. Industrial microorganisms
 - Pre-requisites for industrial microorganisms
 - Prospection, isolation and selection of organisms with industrial potential
 - GRAS status
3. Identification and characterisation of microbes
 - The importance of microbial identification and characterisation
 - Methods of identification and characterisation
4. Preservation of industrial microbes
 - Preservation methods
 - Assessment of purity, viability and genetic stability
 - Culture collections
5. Strain improvement
6. Fermentation substrates
 - Media formulation
 - Industrial waste as fermentation media
7. Major industrial processes and products
8. Probiotics: application in food matrices
 - Screening, isolation and selection of new isolates
 - Characterization of the isolates in terms of industrial application

Recommended reading

1. Baltz, R. H. , Demain, A. L. , Davies, J. E. (2010). Manual of Industrial Microbiology and Biotechnology, 3rd edition, ASM Press, Washington
2. Wailes, M. , Morgan, N. , Rockey, J. (2002). Industrial Microbiology, Blackwell Science
3. Wilson, D. B; Sahm, H. ; Stahmann, K. -P. ; Koffas, M. (Editors) (2020). Industrial Microbiology, Wiley-VCH, ISBN: 978-3-527-34035-4, 424 Pages
4. Journals of specialty, e. g. , Journal of Industrial Microbiology & Biotechnology; World Journal of Microbiology & Biotechnology

Teaching and learning methods

Lectures using audio-visual media and teacher-student interaction (presentation and discussion of case-studies). Preparation of a project and aboratorial work.

Assessment methods

1. Regular students - (Regular) (Final, Special)
 - Projects - 60% (Elaboration of a laboratory project on industrial microbiology (mark > 9. 5))
 - Final Written Exam - 40% (Final written exam on the theoretical contents (mark > 9. 5))
2. Working students - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 40% (Written exam on the theoretical contentes (mark > 9. 5))
 - Projects - 60% (Project on industrial microbiology (mark > 9. 5))
3. Recourse - (Regular, Student Worker) (Supplementary, Special)
 - Projects - 60% (Revised version of project)
 - Final Written Exam - 40% (Written exam on the theoretical contents)

Language of instruction

English

Electronic validation

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18-01-2024	18-01-2024	23-01-2024	23-01-2024